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ANL/NDM-56

Fast-Neutron Interactions with ^{182}W, ^{184}W, and ^{186}W

by

P.T. Guenther, A.B. Smith, and J.F. Whalen

June 1981

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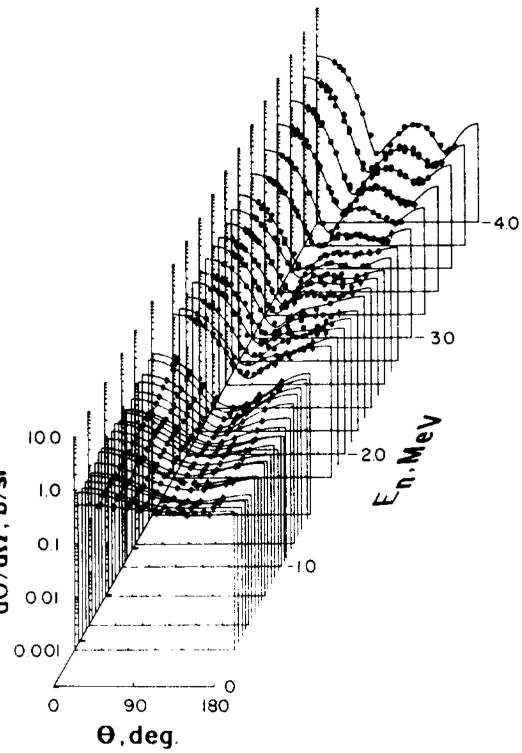

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Applied Physics Division
Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439
USA

NUCLEAR DATA AND MEASUREMENTS SERIES

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FAST-NEUTRON INTERACTIONS WITH ^{182}W, ^{184}W and ^{186}W*+

by

P. T. Guenther, A. B. Smith and J. F. Whalen
Applied Physics Division
Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60439 U.S.A.

ABSTRACT

Neutron total cross sections of ^{182}W, ^{184}W and ^{186}W are measured from $\approx$0.3 - 5.0 MeV at intervals of $\lesssim$50 keV to accuracies of 1 - 3%. Differential neutron elastic- and inelastic-scattering cross sections of the same three isotopes are measured at scattering angles in the range 20 - 160 deg. and at incident-neutron energy intervals of $\approx$100 keV from 1.5 - 4.0 MeV. Approximately thirty scattered-neutron groups are observed for each of the isotopes. Prominent of these are excitations attributed to collective rotational and vibrational bands. The experimental results are interpreted in terms of optical-statistical and coupled-channels models with particular attention to the direct excitation of ground-state-rotational and β- and γ-vibrational bands. The strengths of the direct interactions and the magnitudes of the collective deformations are inferred from the interpretations and compared with similar values previously reported elsewhere. The experimental results are used to deduce experimentally-based evaluated data sets for ^{182}W, ^{184}W and ^{186}W over the energy range 0.1 - $\approx$5.0 MeV.

Keywords: Nuclear Reactions: Measured σ_n(total) of ^{182}W, ^{184}W, ^{186}W, 0.3 - 5.0 MeV; Measured $d\sigma/d\Omega_n$ (elastic and inelastic) 1.5 - 4.0 MeV, 20 -160 deg.; Optical-statistical and coupled-channels model interpretations.

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+All measured data reported herein have been transmitted to the National Nuclear Data Center, Brookhaven National Laboaratory.

I. INTRODUCTION

The fast-neutron interaction with the even isotopes of tungsten is of basic and applied interest. Approximately 85% of the element consists of the isotopes ^{182}W, ^{184}W, and ^{186}W. These isotopes lie at the upper extreme of a region of static deformation where the degree of deformation is expected to change significantly in four mass units (I-1). Thus, these isotopes offer an unusual opportunity to study the effects of changing deformation on the neutron interaction at few-MeV neutron energies. Such interactions at these energies are a mixture of compound-nucleus and direct-reaction processes not easily studied using charged-particle probes. Neutron excitation of collective rotational and/or vibrational states can be large (I-2), and anomalous excitation of the ground-state rotational band in the complimentary region of changing deformation near A=150 has been reported (I-3). It has been suggested that collective excitations are charge dependent (I-4), a postulate that can be examined by comparing parameters deduced from neutron measurements with those reported from charge-sensitive studies (e.g., from proton scattering and coulomb excitation measurements). It has been suggested that neutron total cross sections in this region are sensitive to the character of the deformation (I-5) and observed neutron total cross sections have been interpreted in terms of quadrupole and hexadecupole deformations (I-6). Neutron differential-elastic-scattering distributions are also sensitive to deformation, particularly at large scattering angles (I-7) and the direct-neutron excitation of the ground-state rotational band can be much larger than the compound-nucleus contribution in the several MeV region (I-8).

Elemental tungsten is employed in high-temperature nuclear-energy systems. Some nuclear properties of the even isotopes of tungsten are similar to those of a number of nuclides in the fission-product and actinide regions (e.g., to even rare-earth, uranium, and plutonium isotopes) which are of considerable applied importance but very difficult to experimentally study. Because of these experimental difficulties recourse if often made to theoretical models. The validity of such models is ultimately based upon experimental observation and the present experimental studies of the even isotopes of tungsten provide such a foundation.

The goal of the present work was an improved knowledge of the experimental and calculational understanding of the fast-neutron interaction with the even isotopes of tungsten in the few-MeV region. The experimental methods are outlined in Section II. Section III presents the experimental results and Section IV deals with their interpretation in the context of optical-statistical and coupled-channels models. Section V presents a limited experimentally-based evaluation of the cross sections dealt with in the present study.

References, Section I.

I.1. Table of Isotopes, 7th Edition, Eds. C. M. Lederer and V. S. Shirley, John Wiley and Sons, Inc., New York (1978).

I.2. D. Chase, L. Wilets and A. Edmonds, Phys. Rev., 110, 1080(1978).

I.3. D. Coope, S. Tripathi, M. Schell, J. Weil and M. McEllistrem, Phys. Rev., C16, 2223(1977).

I.4. V. Madsen, V. Brown, S. Grimes, C. Poppe, J. Anderson, J. Davis and C. Wong, Phys. Rev., C13, 548(1976).

I.5. R. Shamu, E. Berstein, D. Blondin, J. Ramirez and G. Rochau, Phys. Lett., 45B, 241(1973).

I.6. Ch. Lagrange, National Soviet Conf. on Neutron Physics, Kiev (1975).

I.7. P. Guenther, "Elastic and Inelastic Neutron Scattering from the Even Isotopes of Tungsten," Univ. of Ill. Thesis (1977).

I.8. P. Guenther, D. Havel and A. Smith, "Fast-neutron Excitation of the Ground-state Rotational Band of ^{238}U," Argonne Natl. Lab. Report, ANL/NDM-16, (1975).

II. EXPERIMENTAL METHODS

A. Samples

The present measurements employed the three isotopically-enriched tungsten samples defined in Table II-1. The samples were fabricated into right-circular cylinders of metallic tungsten using powdered-metallurgical procedures at Oak Ridge National Laboratory (II-1). The sample densities approached that of the elemental metal. Chemical impurities were negligible. It was assumed that the samples were of uniform density although this assumption could not be verified by destructive assay. The similarity of the respective cross sections of the prominent isotopes and the high enrichments of the samples resulted in corrections for minor-isotope content generally much smaller than the experimental uncertainties and thus such corrections were ignored. All cross sections reported herein are stated in terms of "effective atom" of the respective sample. The measurement procedures involved reference-standard samples of hydrogen (polyethylene) and verification samples of elemental carbon all of which were fabricated to the same dimensions as the isotopic tungsten samples. Some ancillary measurements employed elemental tungsten and the requisite samples were machined from high-chemical-purity elemental bar stock.

Table II-1. Measurement Samples

Identification	^{182}W	^{184}W	^{186}W
Weight (gm)	125.7	125.9	124.9
Radius (cm)	1.048	1.041	1.038
Height (cm)	1.996	1.994	1.989
Isotopic Abundance[a] in Atom-percent			
^{180}W	<0.05	<0.05	<0.05
^{182}W	94.9	1.38	0.58
^{183}W	1.58	1.84	0.41
^{184}W	2.39	98.88	1.34
^{186}W	1.17	2.89	97.66

[a]Values provided by Oak Ridge National Laboratory assay.

B. Neutron Total-cross-section Measurements

The neutron total-cross-section measurements were made using the monoenergetic-pulsed-beam facility at the Argonne Fast Neutron Generator. This facility and its application to total-cross-section measurements have been described elsewhere, therefore only an outline is given here (II-2).

The $^7Li(p,n)^7Be$ reaction was used as a neutron source with the source dimensions confined to a ≈3 mm diameter spot (II-3). The proton beam was pulsed at a 2 MHz repetition rate with a pulse duration of ≈1 nsec. The mean neutron energy was determined to within ≈10 keV by control of the proton energy and verified by the observation of well known resonances in a number of materials (e.g., carbon) (II-4,5). The neutron source was surrounded by a massive shield with a 1 cm diameter collimating aperture at a zero-degree source-reaction angle. The collimated beam was incident on the transmission samples placed ≈25 cm from the collimator exit. The samples were mounted upon a wheel with neutrons incident upon the sample-cylinder bases. The wheel concurrently contained a number of measurement samples, a carbon reference sample and one or more void positions and was rotated in a stepping motion so as to change the sample (or void) positions twenty or more times a minute. No independent monitoring of source intensity was required. A proton-recoil-scintillation detector was placed 4-7 m from the transmission samples on the neutron beam axis. The response of the detector was determined in such a manner as to obtain the time-of-flight of the neutrons from the source, through the sample position, to the detector. The resulting velocity spectra were stored in a digital computer in correlation with the sample-void positions of the sample wheel. The neutron velocity resolution was sufficient to resolve the primary neutron group of the source reaction from the secondary-source group and from the time uncorrelated background and to define the spectral distribution of the neutron beam to within ≈100 keV.

The "observed" neutron total cross sections were calculated from the measured sample transmissions in the conventional manner (II-6). Inscattering corrections were estimated, found small, and neglected. Small dead-time corrections were made using a reference-clock pulse introduced into the data-acquisition system. Throughout the tungsten sample measurements the neutron total cross sections of elemental carbon were concurrently determined with good agreement with the values reported in the literature (II-7).

C. Neutron Scattering Measurements

The neutron scattering measurements employed the pulsed-beam fast-neutron time-of-flight technique and the multi-angle detection system at the Argonne Fast Neutron Generator. This measurement apparatus and its application have been extensively described elsewhere and thus the procedures are only outlined here (II-8,9).

The neutron source was again the $^7Li(p,n)^7Be$ reaction with the metallic lithium film adjusted to provide incident-neutron energy spreads at the scattering samples of ≈10 to 50 keV (II-3). The average energy of the incident neutrons was determined to within ≈10 to 20 keV by control of the incident-proton beam. The source was pulsed at a repetition rate of 1 or 2 MHz with a burst duration of ≈1 nsec. The scattering samples were placed ≈13 cm from the source at a zero-degree source-reaction angle with the neutrons incident upon the cylindrical surfaces of the samples. The scattering samples placed at the common focus of the flight paths. Massive shielding defined the flight paths and protected the detectors from the primary neutron source and various other background components. Most of the measurements were made at scattered-neutron flight paths of ≈5.4 m. A few measurements improved the scattered-neutron velocity resolutions by using flight paths of ≈20 m. The relative angular placement of the flight paths was determined to within ±0.5 degrees using optical methods. The absolute setting of the relative angular system was then determined to within <1.0 degree by the observation, at a fixed incident energy, of the energies of neutrons scattered from hydrogen at a number of angles to both sides of the zero-degree center line.

The neutron detectors consisted of proton-recoil scintillators 13 cm in diameter and 2 cm thick (for measurements at ≈5 m flight paths) or 20 cm in diameter and 3 cm thick (for measurements at ≈20 m flight paths). Pulse-shape-sensitive circuitry was employed to suppress gamma-ray-induced backgrounds in the detectors. An additional time-of-flight system, supported by an array of long counters, monitored the primary source intensity (II-10). The monitors were arranged so as to be insensitive to the physical placement of the flight-path collimators. The relative energy-dependent response of each of the detectors was determined by observation of the neutrons emitted at the spontaneous fission of ^{252}Cf and/or by the observation of neutrons scattered from hydrogen over a range of scattering angles (II-11). The absolute normalizations of these relative responses were determined by the observation of neutrons scattered from hydrogen at each of the measurement energies. The responses of the ten detectors were determined in a largely independent manner thus there was a considerable degree of redundancy in the determination of cross section magnitudes. These calibration and measurement procedures imply that the tungsten scattering cross sections were measured relative to the well known H(n,n) cross sections (II-12). Throughout the scattering measurements the fidelity of the measurement system was verified by the concurrent measurement of the well known C(n,n) cross sections (II-7).

The eleven measured velocity spectra (ten scattering channels and a monitor channel) and associated detector proton-recoil responses were stored in a digital computer system. Subsequent off-line analysis reduced the observed spectra to neutron cross sections in a manner described in Ref. II-9. All of the cross section results, including those associated with the hydrogen reference standard, were corrected for angular-resolution, beam-attenuation, and multiple-event effects using a combination of Monte-Carlo and analytical procedures as described in Ref. II-9.

References, Section II.

II-1. The authors are indebted to Mr. E. Kobisk et al., Oak Ridge National Laboratory, for the fabrication of the tungsten samples.

II-2. A. Smith and J. Whalen, "Comments on Energy-Averaged Neutron Total Cross Sections," Argonne National Laboratory Report, ANL/NDM-33 (1977).

II-3. J. Meadows and D. Smith, "Neutrons from Proton Bombardment of Natural Lithium," Argonne National Laboratory Report, ANL-7938 (1978).

II-4. G. D. James, Proc. Sym. on Neut. Stds. and Applications, National Bureau of Standards Pub., NBS-SP-493 (1977).

II-5. S. Cierjacks, P. Forti, D. Kopsch, L. Kropp, J. Nebe and H. Unfeld, "High Resolution Total Neutron Cross Sections between 0.5-3.00 MeV," Karlsruhe Report, KFK-1000 (1968).

II-6. D. Miller, "Fast Neutron Physics," Vol.-II, Eds. J. Marion and J. Fowler, Interscience Pub., N.Y. (1963).

II-7. A. Smith, R. Holt and J. Whalen, "Neutron Scattering from ^{12}C in the Few MeV Region," Argonne National Laboratory Report, ANL/NDM-43 (1978).

II-8. A. Smith, P. Guenther, R. Larson, C. Nelson, P. Walker and J. Whalen, Nucl. Insts. and Methods, 50, 277(1967); see also P. Guenther, A. Smith and J. Whalen, Phys. Rev., C12, 1797(1975).

II-9. P. Guenther, "Elastic and Inelastic Neutron Scattering from the Even Isotopes of Tungsten," Univ. of Illinois Thesis (1977).

II-10. A. Hanson and J. McKibben, Phys. Rev., 72, 673(1947).

II-11. A. Smith, P. Guenther, R. Sjoblom, Nucl. Instr. and Methods, 140, 397(1977).

II-12. J. Hopkins and G. Breit, Nucl. Data, A9, 137(1971).

III. EXPERIMENTAL RESULTS

A. Neutron Total Cross Sections

The objective was energy-averaged neutron total cross sections comparable with the differential-scattering results and the predicitons of energy-averaged models. Therefore the experimental resolutions were chosen to be ≈20-50 keV and generally averaged fluctuating structure excepting, possibly, at the very lowest energies of the present measurements. The measurements were made during three different periods in each of which the cross sections were determined from a few-100 keV to 5 MeV in steps of $\lesssim$50 keV. The results of the three sets of measurements were generally consistent to within the 1-3% statistical accuracies of the individual measurements. It was believed that systematic experimental uncertainties were generally smaller than the statistical uncertainties.

The above "observed" cross sections are strictly relevant only to the specific samples employed in the measurements. It has been shown by Poenitz et al. (III-1) that self-shielding perturbations can be significant in broad-resolution neutron-total-cross-section measurements involving heavy nuclides in the few-100 keV region. The "observed" value can be considerably smaller than the "true" or infinitely-thin-sample value. The correction of the "observed value" for self-shielding can be calculated from the statistical properties of the underlying fluctuating structure, as described in Ref. III-1, or determined experimentally using a wide range of transmission-sample thicknesses. The latter approach was not explicitly possible in the present case as the integrity of rare samples could not be destroyed. Therefore, the calculational procedures of Ref. III-1 were followed. The potential cross sections and average resonance properties were derived from optical-model phase shifts using an optical potential that described the low energy behavior of the observed neutron total cross sections. Assuming a single-level Breit-Wigner resonance formulation, average level spacings from a fermi gas model and Wigner and Porter-Thomas distributions of level-spacings and width-fluctuations, respectively, a monte-carlo simulation of the resonance cross sections was constructed from which the correction factors applicable to the present experiments were inferred. The details of the calculational procedure are contained in Ref. III-1. The resulting correction factors can be large at low energies as illustrated in Fig. III-1A where, for the present samples, the effect is nearly 20% at 100 keV; decreasing with energy to a negligible effect at 1 MeV.

It is possible to experimentally test the above calculated correction factors in an elemental context. Assuming the element consists of only the present three isotopes (≈85% abundance), corrections applicable to elemental measurements can be derived from the above isotopic correction factors. These elemental correction factors were applied to the results of elemental neutron-total-cross-section measurements made with a wide range of sample thicknesses and incident energies with the results illustrated in Fig. III-1B. The elemental cross-section results obtained with a wide range of sample thicknesses, when corrected with the above deduced factors, are constant with sample thickness to well within their respective statistical accuracies and to generally better than 1%. This experimental test gives confidence in the correction factors that were applied to all of the present isotopic neutron-total-cross-section results. Similar corrections were made to the low-energy results previously obtained at this laboratory as the identical samples were involved (III-2).

The three sets of corrected data from the present measurements were combined and averaged over 50 keV intervals to 2.0 MeV and over 100 keV intervals at higher energies. The uncertainties in the averaged quantities were defined as the RMS values of the statistical uncertainties of the individual components making up the respective average quantity. These average results are illustrated in Fig. III-2. Qualitatively, the neutron total cross sections of these three isotopes are very similar. However, there are magnitude differences, particularly in the energy range ≈0.3 - 2.0 MeV where the total cross sections of ^{184}W and ^{186}W are nearly identical while those of ^{182}W are systematically smaller. There are also energy-dependent shape differences that cannot be attributed to erroneous sample densities. The possible physical implications of these differences are discussed in Sec. IV, below.

There are only three sets of previously reported data that are directly comparable with the present results. Whalen et al. (III-2) have reported neutron-total-cross-section results for all three isotopes from 0.1 to 0.65 MeV. As corrected (see above), the results of Ref. III-2 are in very good agreement with those of the present work. They do display more fluctuating structure due to their finer resolution. Martin et al. (III-3) have reported neutron total cross sections for the three isotopes from ≈0.7 - 15 MeV. The ^{184}W and ^{186}W results of Ref. III-3 are not qualitatively consistent with those of the present work in either shape or magnitude (as illustrated in Fig. III-2) with the lower-energy region deviating by 10% or more from the present results and from an extrapolation of the values of Ref. III-2. The differences are energy dependent and not simply attributable to sample-density effects or to the above self-shielding phenomena. Foster and Glasgow (III-4) have reported neutron total cross sections of the present three isotopes over the energy range 2.5 - 15.0 MeV. Their results are generally consistent with those of the present work as illustrated in Fig. III-2. The isotopes of the present study make up ≈85% of the element. Thus, assuming the neutron total cross sections of the remaining ≈15% of the isotopes are similar to those of the even isotopes measured here, the weighted average of the present results should agree with the neutron total cross sections reported for the natural element (III-5). An inspection of the available information indicates that is true within the respective experimental uncertainties.

B. Elastic Neutron Scattering

The primary elastic-scattering-measurement problem was the experimental resolution of the elastic-neutron group from the inelastic neutron component corresponding to the excitation of the first level at ≈110 keV. Most of the measurements were made with flight paths of ≈5 m and resolved the elastic component to energies of ≈2.5 MeV as illustrated by the time distribution of Fig. III-3. At higher incident energies and forward scattering angles the resolution was less complete therefore selected measurements were made at flight paths of ≈20 m. With these longer flight paths the resolution improved as illustrated in Fig. III-4. However, the ≈20 m flight-path measurements were tedious and thus undertaken only at selected energies (e.g. 2.5, 3.0

and 3.5 MeV) and the results used to correct lesser-resolution ≈5 m flight-path results obtained at nearby incident energies for the partially resolved inelastic-neutron contaminent.

Measurements were generally made at intervals of ≈200 keV from 1.5 to 4.0 MeV with incident-neutron resolutions of $\lesssim$20 keV and at $\gtrsim$20 scattering angles distributed between 20-160 deg. At some incident energies a large number of distributions were obtained over a period of time (e.g. at 3.0 MeV), cumulatively amounting to more than 100 differential cross section values, each with essentially independent normalizations. In these highly redundant cases the data were averaged to obtain distributions consisting of 20-30 differential values. The resulting differential-elastic-scattering cross sections are summarized in Figs. III-5A, B and C. The quality of these distributions varies depending upon the statistical accuracies of the particular measurements, the care taken with the detector normalizations, the experimental resolutions employed in the particular measurements and the number of independent components of a given distribution. Generally, the statistical accuracies of the differential measurements were several percent and frequently ≈1%. The detector normalizations were reproducible to 3-5%. Correction procedures, e.g. those correcting for multiple events, generally introduced an additional 1-5% uncertainty except near the extreme cross-section minimia where uncertainties due to the correction factors could become larger. Uncertainties associated with the knowledge of the H(n,n) reference cross section were relatively small (i.e. $\lesssim$1.0%). A primary concern in estimating uncertainties was the effect of varying experimental resolutions. In some cases the resolution was relatively good and its influence could be quantitatively determined as illustrated by the gaussian fitting of the time distribution of Fig. III-3. In other cases the estimate of the effect of resolution was far more subjective but was made with a conservative philosophy. These various factors contributing to the uncertainties associated with the differential-elastic-scattering data are reflected by the error bars indicated in the three portions of Fig. III-5.

The measured differential-elastic-scattering cross sections were least-square fitted with a Legendre-polynomial series of the form

$$\frac{d\sigma}{d\Omega} = \frac{\sigma}{4\pi}\left[1 + \sum_{\ell=1}^{8} \omega_\ell P_\ell\right] \tag{III-1}$$

where ω_ℓ and P_ℓ are conventional omega coefficients and Legendre polynomials, respectively. The fitting procedure was constrained to be consistent with Wick's Limit (III-6) at zero degrees and to provide a relatively smooth energy dependence of the extrapolation to 180 deg. cross-section values. The results of these fitting procedures are illustrated in Figs. III-5 and 7. Generally, the behavior of the distributions derived from the fitting follows a smooth-energy dependence with the largest deviations confined to those cases where only a limited number of experimental values were available. The fitting procedures also provided the angle-integrated elastic scattering cross sections shown in Fig. III-6. The estimated uncertainties in these angle-integrated cross sections varied from 5 to 7% and the individual results were consistent to well within this estimate.

Previously reported elastic measurements of neutron scattering from these isotopes of tungsten appear to be confined to the lower energy work of Lister et al. (III-7) and the 3.4 MeV results of Delaroche et al. (III-8). The present results reasonably extrapolate to the lower-energy values of Lister et al. as illustrated in Fig. III-6. The present 3.5 MeV results generally agree with those reported by Delaroche et al. to within the respective experimental uncertainties as illustrated in Fig. III-7.

C. Neutron Inelastic Scattering

The majority of the neutron-inelastic-scattering measurements were made with ≈5 m flight paths distributed over the angular range 20-160 deg. Some additional measurements employed ≈20 m flight paths in order to improve the resolution of the elastic component from the nearby inelastic contributions as illustrated in Fig. III-4. There were a number of experimental results with varying detector angles, detector sensitivities and scattered-neutron resolutions. The definition of a given inelastic-neutron group was optimum over a limited energy range and sensitive to the particular instrument configuration. Therefore the measurements were made in systematic incident-energy steps so that the inelastic-neutron groups identified in regions of optimum definition could be followed into regions of marginal resolution. This approach is illustrated in Fig. III-8. Where at all possible, artifacts due to multiple-events and/or to contributions from the second neutron-group from the source reaction were identified and removed. Such corrections introduced some additional uncertainties in both the excitation energies and the corresponding cross sections.

The observed inelastic-neutron excitation energies were determined from the velocity spectra using the measured flight times, incident energies and flight paths. The energy scales were verified by the observation of well known inelastic-neutron groups (e.g. that resulting from the excitation of the 846 keV state in ^{56}Fe). A neutron group was accepted for the excitation-energy determination only if observed with reasonable reliability on at least five occasions each involving several independent detectors. Some of the prominent inelastic-neutron groups were clearly observed more than 100 times. The "observed" excitation energy was defined as the simple average of the individual measured values with the uncertainty expressed as the RMS deviation from the mean. In this manner approximately 30 scattered-neutron groups were identified for each of the three isotopes as summarized in Table III-1A, B and C. Many of these correspond to excitation energies of $\gtrsim$1.5 MeV where the experimental resolution was not comparable to the detail of the expected structure. Even at excitation energies of <1.5 MeV it was apparent that many of the observed levels were composites of contributions from a number of true levels generally closer-spaced than the experimental resolution. Qualitative plots of observed level density versus excitation energy behaved in the expected approximately exponential

Table III-1A. Observed Excitation Energies for $^{182}W^a$

No.	E_x (keV)	No.	E_x (keV)
1	102 ± 8	19	2059 ± 25
2	326 ± 15	20	2121
3	671 ± 14	21	2185
4	1138 ± 16	22	2247
5	1229 ± 12	23	2299
6	1281 ± 22	24	2382 ± 28
7	1309 ± 18	25	2468 ± 15
8	1357 ± 21	26	2543 ± 22
9	1428 ± 38	27	2615 ± 15
10	1492 ± 15	28	2690
11	1539 ± 16	29	2768
12	1618 ± 24	30	(2819)
13	(1678)	31	(2867)
14	1745 ± 23	32	(2932)
15	1792 ± 20	33	(2979)
16	1858 ± 20	34	(3022)
17	1914 ± 20	35	(3062)
18	1988 ± 21		

[a]Uncertainties are RMS values determined from at least four measurements. Parenthesis indicate tentative assignments of observed quantities often due to the excitation of several levels. No uncertainty is given if less than five observations were available.

Table III-1B. Observed Excitation Energies for ^{184}W

No.	E_x (keV)	No.	E_x (keV)
1	111 ± 10	16	1911 ± 25
2	365 ± 20	17	2008 ± 30
3	737 ± 32	18	2105 ± 37
4	905 ± 24	19	2155 ± 34
5	1000 ± 24	20	2240 ± 25
6	1125 ± 17	21	2324 ± 24
7	1237 ± 31	22	2440
8	1323 ± 43	23	2520
9	1376 ± 23	24	2580
10	1435 ± 17	25	2638
11	1528 ± 12	26	2663
12	1613 ± 18	27	2735
13	1667 ± 13	28	(2811)
14	1725 ± 29	29	(2866)
15	1787 ± 32	30	(2918)

Table III-1C. Observed Excitation Energies for ^{186}W

No.	E_x (keV)	No.	E_x (keV)
1	121 ± 7	19	2004 ± 15
2	399 ± 10	20	2073 ± 12
3	742 ± 7	21	2118 ± 12
4	858 ± 18	22	2177 ± 13
5	950 ± 21	23	2241 ± 26
6	1028 ± 32	24	2347 ± 18
7	1182 ± 26	25	2406 ± 12
8	1296 ± 31	26	2462
9	(1397 ± 35)	27	2552
10	1449 ± 24	28	2643
11	1515 ± 35	29	(2713)
12	1589 ± 19	30	(2768)
13	1656 ± 21	31	(2820)
14	(1685 ± 10)	32	(2868)
15	1728 ± 25	33	(2933)
16	1805 ± 15	34	(2979)
17	1893 ± 29	35	(3023)
18	1942 ± 35	36	(3063)

manner to excitation energies of 1.5 - 2.0 MeV then departed from the exponential form as would be expected from incomplete experimental resolutions. Thus, the majority of excitations given in Table III-1 should be interpreted as observables within the context of the experimental resolution. However, the excitation energies are reasonably consistent with previously reported level information as illustrated in Fig. III-9.

The neutron-inelastic-scattering cross sections were derived from the measured velocity spectra in a manner analogous to that employed in the context of elastic scattering. Due to the complexity of the inelastic velocity spectra subjective judgments were involved with consequent increased uncertainties. Differential-inelastic-scattering cross sections were accepted when they were observed at a minimum of three scattering angles and several incident neutron energies. In the case of some of the prominent inelastic-neutron groups several hundred independent differential-cross-section values were available. With the better-resolution-measurements cross sections for several inelastic groups were obtained which corresponded to a single cross-section value observed at a lesser resolution. In such cases the cross section derivation sought the most accurate cross section value rather than the best possible resolution of the components and thus the values for the composite of several contributions was usually emphasized.

At excitation energies $\lesssim$0.8 MeV neutron inelastic scattering from the present three isotopes is dominated by contributions from the ground-state-rotational band; $\approx$110 keV (2+), $\approx$350 keV (4+) and (to a much less extent) the $\approx$700 keV (6+) states. Angular-distribution anisotropy for the excitation of the first two states (2+, 4+) increased rapidly with energy. A number of measured differential cross section values corresponding to the excitation of the first 2+ and 4+ states were combined and averaged where the angles and energies were very similar to obtain the differential cross section distributions shown in Figs. III-10 and -11. The anisotropy of the distributions is clearly evident in these two figures. Qualitatively, these cross section magnitudes for the three isotopes are similar but there are detailed differences in both shape and magnitude. The angle-integrated inelastic scattering cross sections were determined by least-square fitting Eq. III-1 to the measured differential values with the fitting procedure constrained to provide a reasonably smooth energy-dependence of the 0 and 180 deg. extrapolations. Extreme forward- and backward-angle measured values were often least reliable and their uncertainties could influence the polynomial extrapolations well beyond the measured angular range without some sort of constraint. Above $\approx$3.0 MeV the measured values were more limited in angular scope and usually available at only a few incident energies where the flight path was extended to $\approx$20 m. The angle integrated cross sections resulting from the above fitting procedures are summarized in Figs. III-12A, B and C.

Above $\approx$0.8 MeV excitations the neutron groups become increasingly complex and blend into unresolved groups of states at excitations of $\approx$1.5 MeV. The corresponding differential cross sections generally approach isotropy as illustrated in Fig. III-13. Some small anisotropy was observed for cross sections associated with the excitation of 0+ states and/or the β- and γ-vibrational bands as discussed below. Again, the differential cross sections were fitted with legrendre series to obtain the angle-integrated cross sections summarized in Figs. III-12A, B and C. The fitting procedures always used low-order polynomials (e.g.$\leq P_2$) and often assumed isotropy. At higher excitation energies the neutron-inelastic-scattering cross sections of the three isotopes are noticeably different as one might expect form the level structure of Fig. III-9.

The uncertainties associated with the above differential and angle-integrated inelastic-scattering cross sections varied from an optimum of 5% in the best defined cases to 30-50% (or even more) in the marginally observed cases. The respective uncertainties are shown in Figs. III-12A, B and C. The origin of these uncertainties was similar to that outlined above in the context of elastic scattering with much greater emphasis on subjective judgments. The latter were felt to be conservative. The uncertainty estimates were supported by the reproducibility of the results measured over an extended period of time. In addition, the cumulative sum of the above neutron-inelastic- and elastic-scattering components is generally consistent with the observed neutron total cross section over wide energy ranges as discussed in Sec. V., below.

Apparently, only two previous measurements of neutron-inelastic scattering from the present isotopes have been reported. Lister et al. (III-7) have reported experimental values at energies of <1.5 MeV. Their results very nicely extrapolate to the present values as illustrated in Figs. III-12A, B and C. Delaroche et al. (III-8) have reported measured cross sections for the excitation of the ground-state-rotational band at an incident neutron energy of 3.4 MeV. Their results are compared with the present 3.5 MeV values in Fig. III-14. There is qualitative agreement, largely within the uncertainties of the respective measurements. However, there is some tendency for the magnitudes of the results of Ref. III-8 to be systematically larger than those of the present work. There have been some experimental studies of inelastic-neutron scattering from elemental tungsten but those results cannot be simply related to the present isotopic work.

References, Section III.

III-1. W. Poenitz, J. Whalen and A. Smith, "Total-Neutron Cross Sections of Heavy Nuclei," accepted for publication in Nucl. Sci. and Eng. (1980).

III-2. J. F. Whalen et al., Argonne Natl. Lab. Report, ANL-7210 (1966).

III-3. R. C. Martin, P. F. Yergin, R. H. Augustson, N. N. Kaushal, H. A. Medicus and E. J. Winhold, Bull. Am. Phys. Soc., 12, 106(1967).

III-4. D. Foster and D. Glasgow, Phys. Rev., C3, 576(1971).

III-5. Neutron Cross Sections, Brookhaven Natl. Lab. Report, BNL-325, Vol. 2, 3rd Edition, Editors D. Garber and R. Kinsey (1976).

III-6. See A. Lane and R. Thomas, Rev. Mod. Phys., 30, 257(1958).

III-7. D. Lister, A. Smith and C. Dunford, Phys. Rev., 162, 1077(1967).

III-8. J. Delaroche, G. Haouat, R. Shamu, J. Lackhar, M. Patin, J. Sigaud and J. Chardine, Natl. Soviet Conf. on Neutron Phys., Kiev (1977); see also, Conf. on Nucl. Cross Sections for Technology, Natl. Bureau of Standards Pub., NBS-SP-594 (1980).

III-9. Table of Isotopes, 7th Edition, Eds. C. M. Lederer and V. S. Shirley, Wiley Interscience Pub., New York (1978).

Figure Captions, Section III.

Fig. III-1A. Neutron-total-cross-section self-shielding correction factors for ^{186}W. Vertical axis gives the correction factor, the horizontal axis the sample thickness in nuclei/barn (n/b). Curves correspond to various neutron energies distributed from 100 to 500 keV. One and two cm sample thicknesses are noted by arrows.

Fig. III-1B. Relative fully-corrected measured neutron total cross sections of elemental tungsten at illustrative energies of 98, 325 and 475 keV as a function of sample thickness given in nuclei/barn (n/b). Error bars indicate experimental statistical accuracies.

Fig. III-2. Neutron total cross sections of ^{182}W, ^{184}W and ^{186}W. The present experimental results are indicated by data points. Curves denote averages of previously reported experimental results referenced as follows: A = 10 keV average of Ref. III-2, B = 100 keV average of Ref. III-3, and C = 100 keV average of Ref. III-4.

Fig. III-3. Neutron time-of-flight spectrum obtained by scattering 1.8 MeV neutrons from ^{186}W at an angle of 115 deg. (Histogram). The flight-path was 5.5 m. The smooth curve indicates the result of fitting two gaussian distributions to the measured values corresponding to the elastic- and inelastic-(observed E_x = 122 keV) neutron groups.

Fig. III-4. Representative ^{186}W time-of-flight spectra obtained at an incident energy of 3.0 MeV with a flight path of $\approx$20 m. Scattering angles are noted on the individual figures. The elastically-scattered neutron group is to the right of each figure, the inelastic group (E_x $\approx$121 keV) to the left. All distributions are normalized to the same maximum heights. Small ($\approx$5%) backgrounds have been subtracted. Maximum events per measurement time vary from several times 10^3 to several times 10^2.

Fig. III-5. Measured differential-neutron-elastic-scattering cross sections of ^{182}W(A), ^{184}W(B) and ^{186}W(C). Data points indicate the measured values and curves the results of least-square fitting Eq. III-1 to the measured results as described in the text. (Cross-sections are given in b/sr and scattering angle in lab.-deg.)

Fig. III-6. Measured neutron elastic-scattering (circular symbols) and total (crosses) cross sections of ^{182}W, ^{184}W and ^{186}W. The elastic scattering values at energies below 1.5 MeV were taken from Ref. III-7. Curves are "eye-guides" described in Sec. V of the text.

Fig. III-7. Illustrative measured neutron differential-elastic-scattering cross sections of ^{182}W(A), ^{184}W(B) and ^{186}W(C). The present experimental results are noted by circular data points, those of Ref. III-8 by crosses. Curves denote the results of a least-square fit of Eq. III-1 to the present measured values as described in the

Figure Captions, Section III. (Contd.)

text. Incident neutron energies are numerically given in MeV (cross sections are in b/sr and scattering angle in lab.-deg.).

Fig. III-8. Representative TOF spectra for ^{186}W obtained at several incident energies. Primed quantities indicate scattering from the second source-reaction group. Incident energies (MeV) and specific observed excitation energies (keV) are numerically noted. Plural scattering is also indicated. The inelastic neutron groups are emphasized with gaussian eye-guides. The gradual loss of resolution, as well as the increased complexity of the spectra, with incident energy is evident.

Fig. III-9. Excitations observed in the present neutron-scattering experiments (boxes) compared with the level structure given in the compilation of Ref. III-9. Reported excitation energies in MeV and J^{π} values are given to excitations of ≈1.2 MeV. More details of the structure information are given in Ref. III-9.

Fig. III-10. Angular distributions of neutrons resulting from the excitation of the 2+ member of the ground-state rotational band of ^{182}W, ^{184}W and ^{186}W. Measured values are indicated by data points. Curves denote the results of a least-square fit of Eq. III-1 to the measured values. Scattering angle is given in lab.-deg. and cross section in b/sr.

Fig. III-11. Angular distributions of neutrons resulting from the excitation of the 4+ member of the ground-state rotational band of ^{182}W, ^{184}W and ^{186}W. Notation is identical to that of Fig. III-10.

Fig. III-12. Inelastic-neutron-scattering excitation cross sections of; (A) ^{182}W, (B) ^{184}W, and (C) ^{186}W. Circular data points indicate measured values where those at energies of less than 1.5 MeV are taken from Ref. III-7. Crossed data points indicate measured results combined with the previous (and lower energy) excitation. Observed excitation energies are numerically given in keV. Curves are "eye-guides" constructed through the measured values.

Fig. III-13. Some illustrative differential-neutron-scattering cross sections of the ^{186}W at an incident neutron energy of 3.0 MeV. Data points indicate measured values with excitations given in keV. Curves are the results of least square fitting procedures as described in the text. Scattering angle is given in lab-degrees and cross section in b/sr.

Fig. III-14. Comparison of measured cross sectons for the excitation of the 2+ and 4+ states of the ground-state rotational bands of ^{182}W, ^{184}W and ^{186}W. Circular data points indicate the results of the present work at an incident energy of 3.5 MeV, crosses the results of Delaroche et al. (III-9) at an energy of 3.4 MeV. Cross section is given in b/sr and scattering angle in lab-deg.

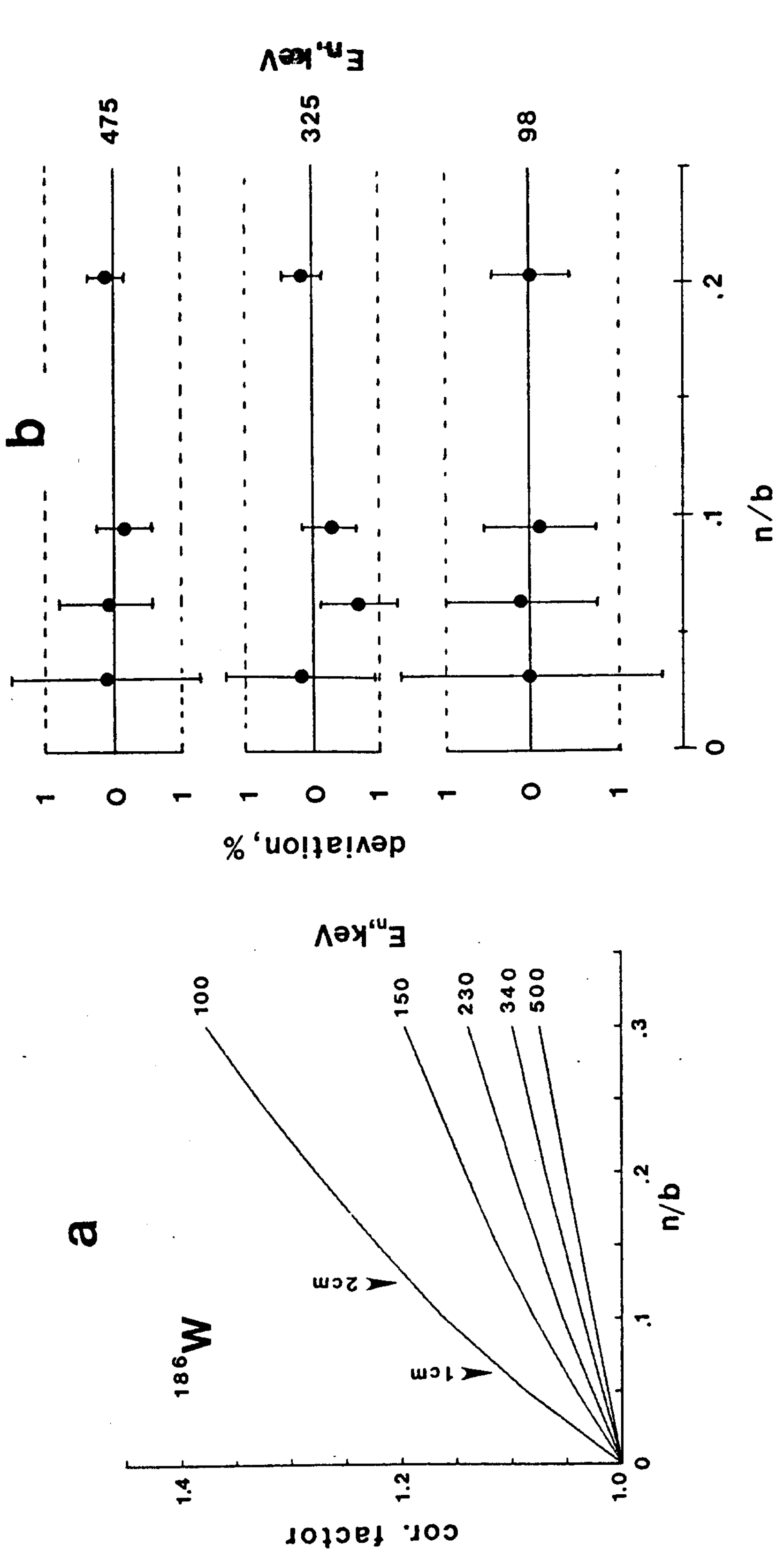

b
deviation, %
1
0
1
475
325
98
E_n, keV
n/b
0
.1
.2
a
186W
cor. factor
1.4
1.2
1.0
1cm
2cm
100
150
230
340
500
.3

Fig. III-1.

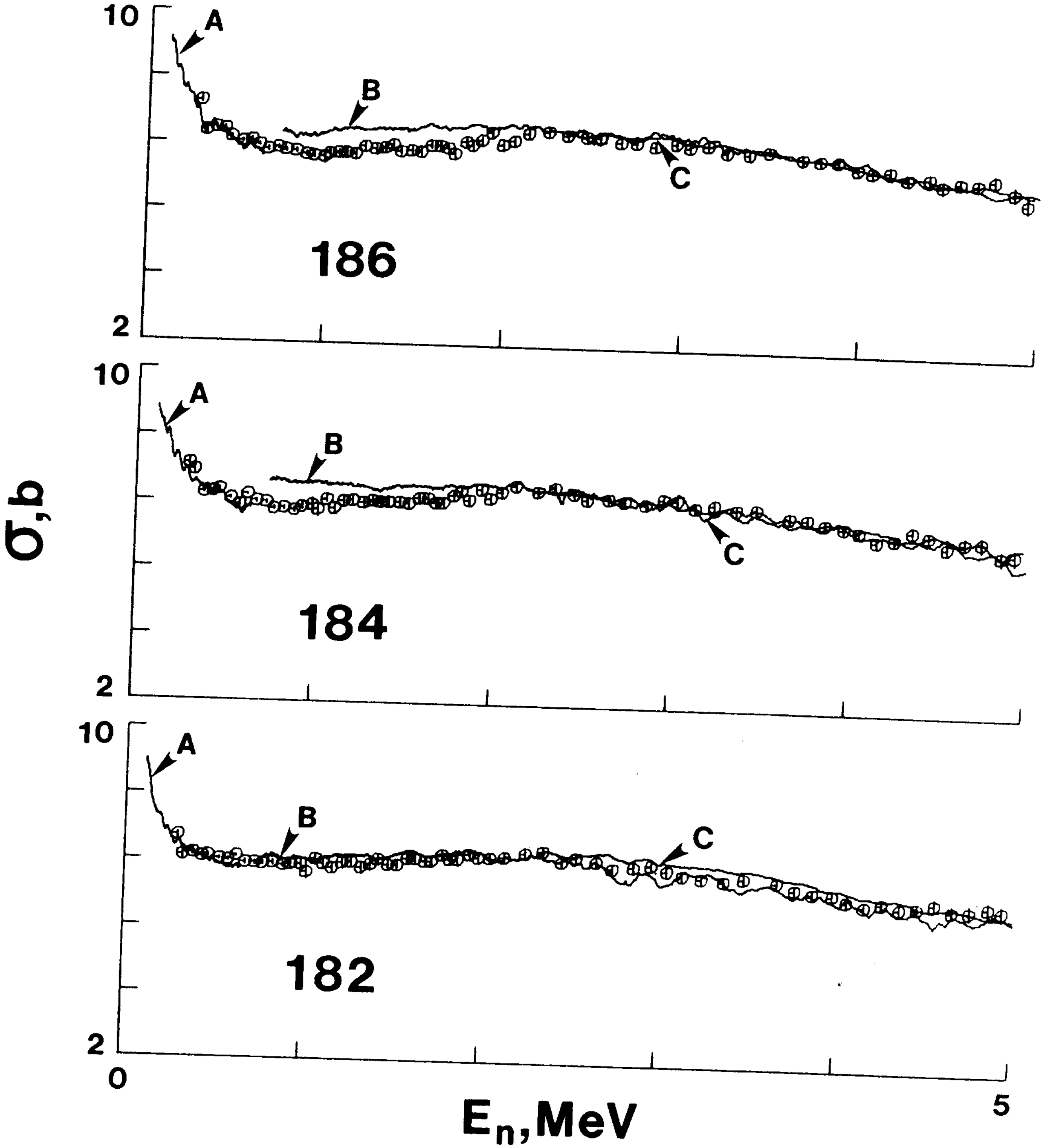
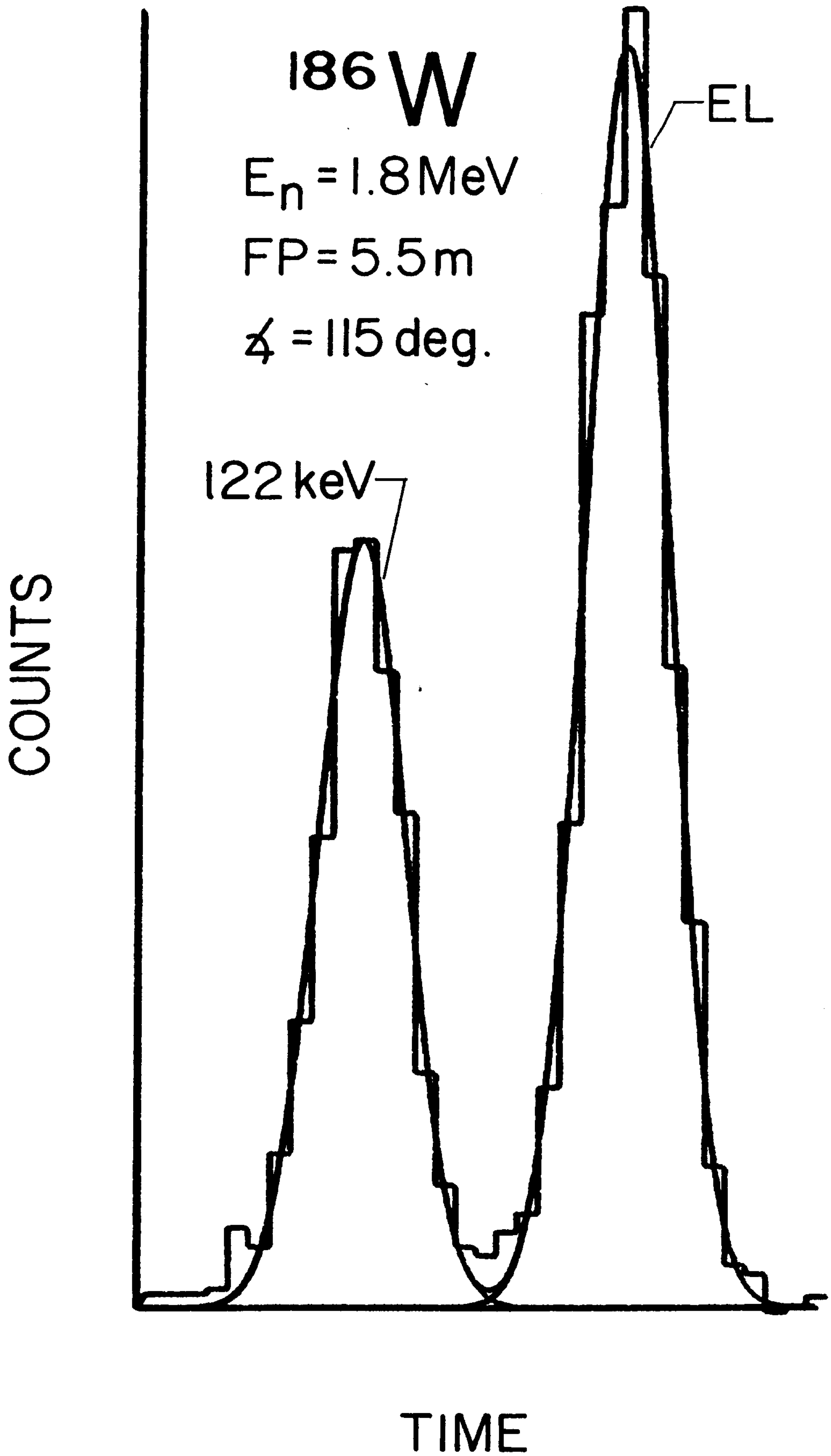


Fig. III-2.



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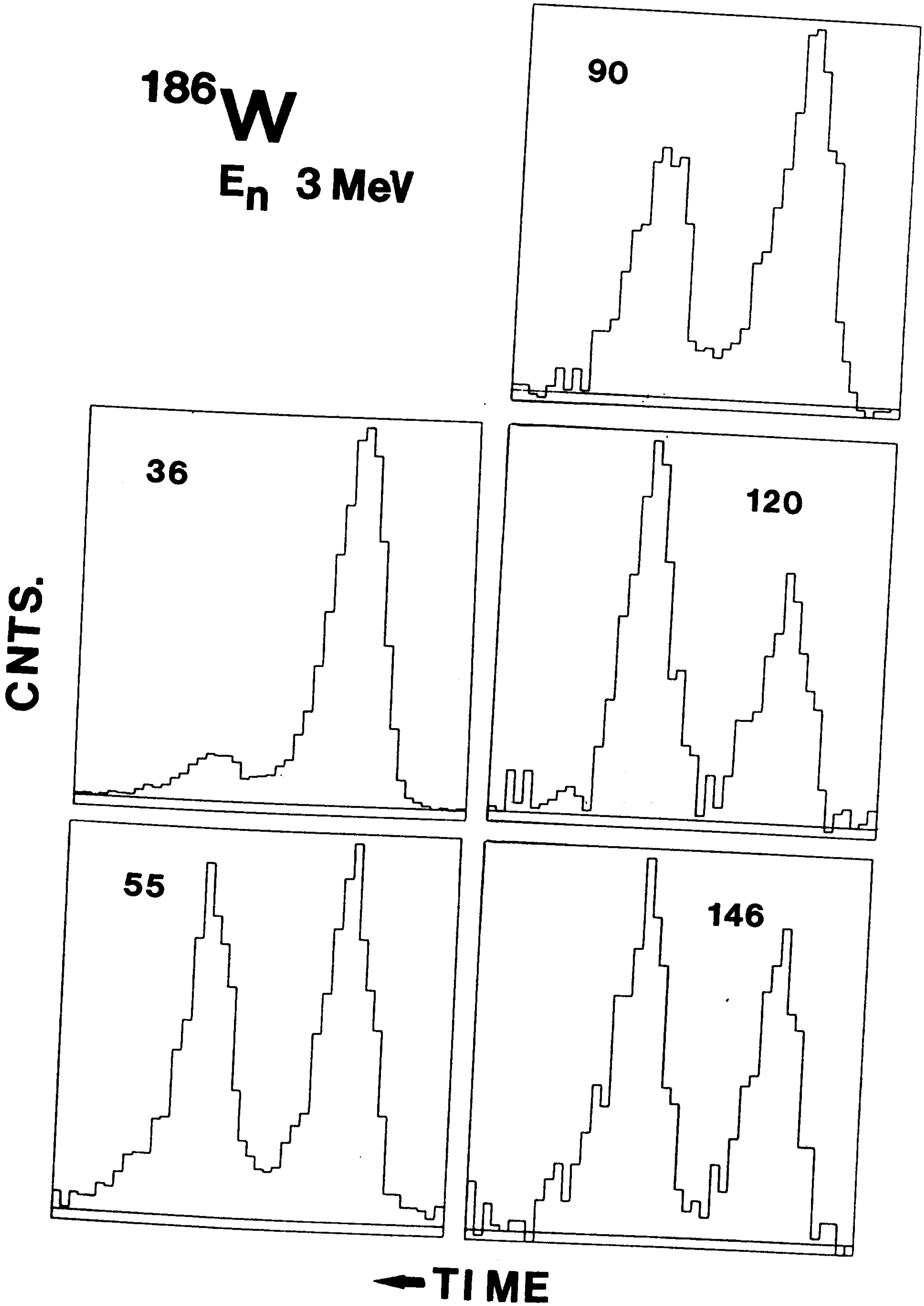

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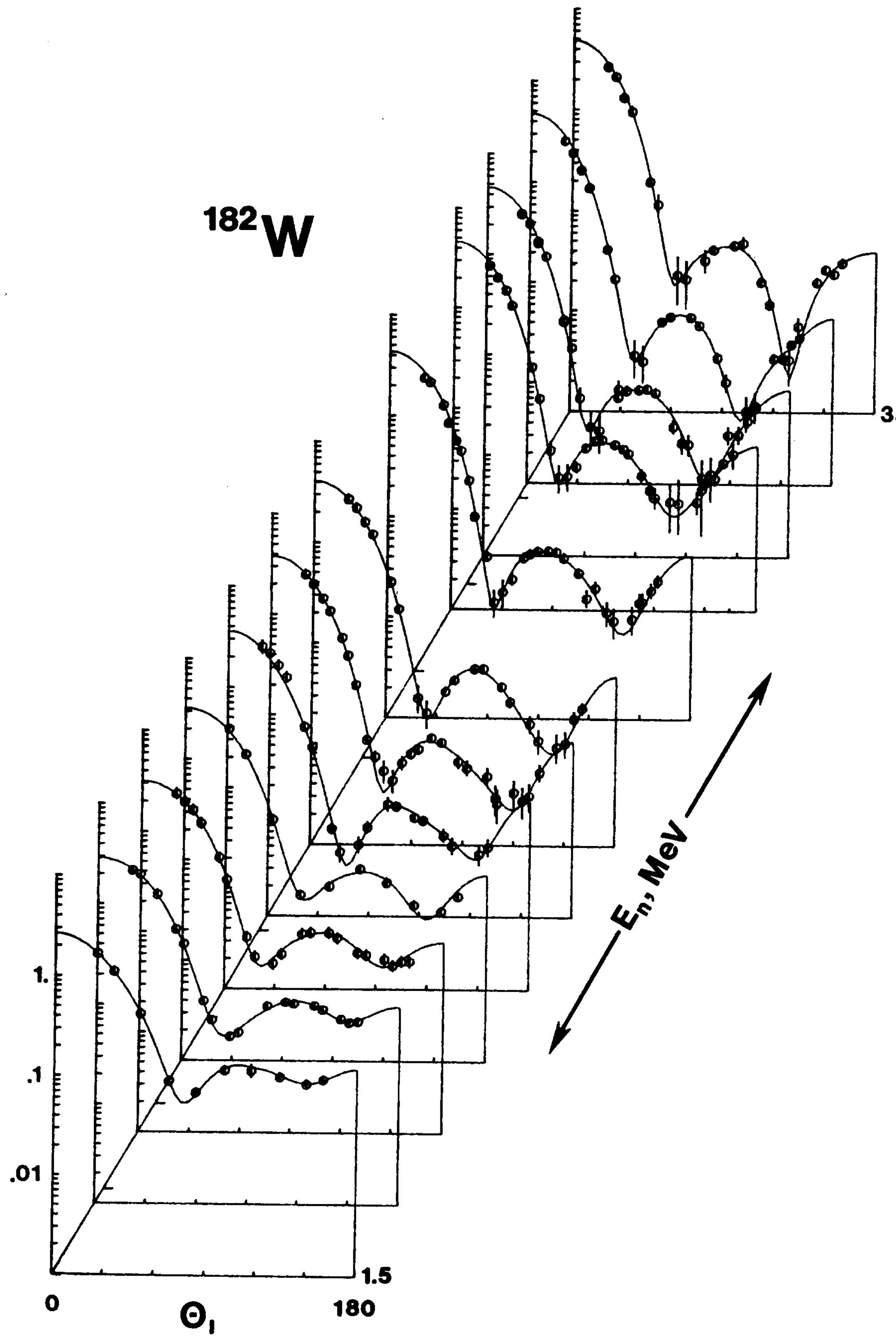


Fig. III-5A.

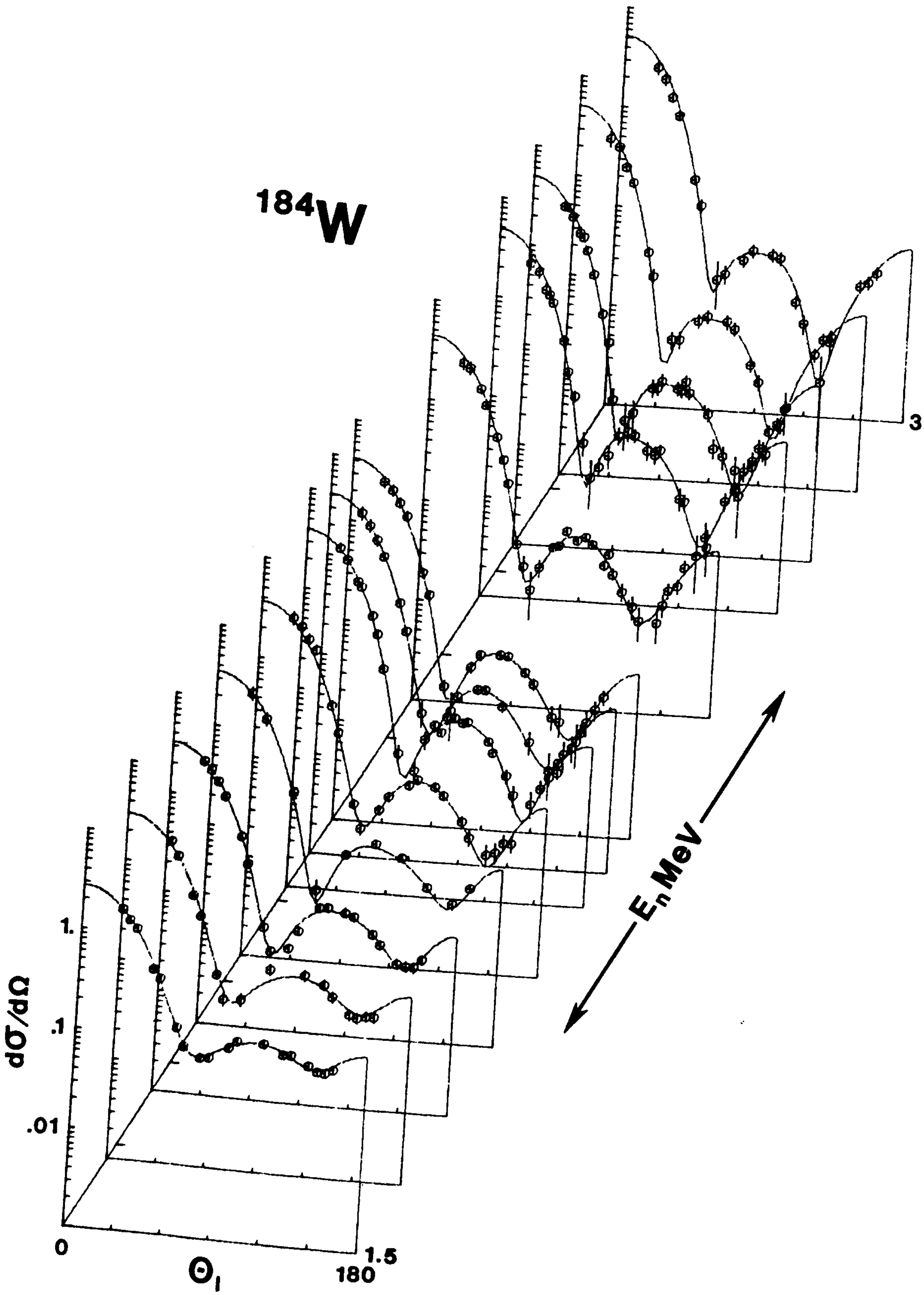


Fig. III-5B.

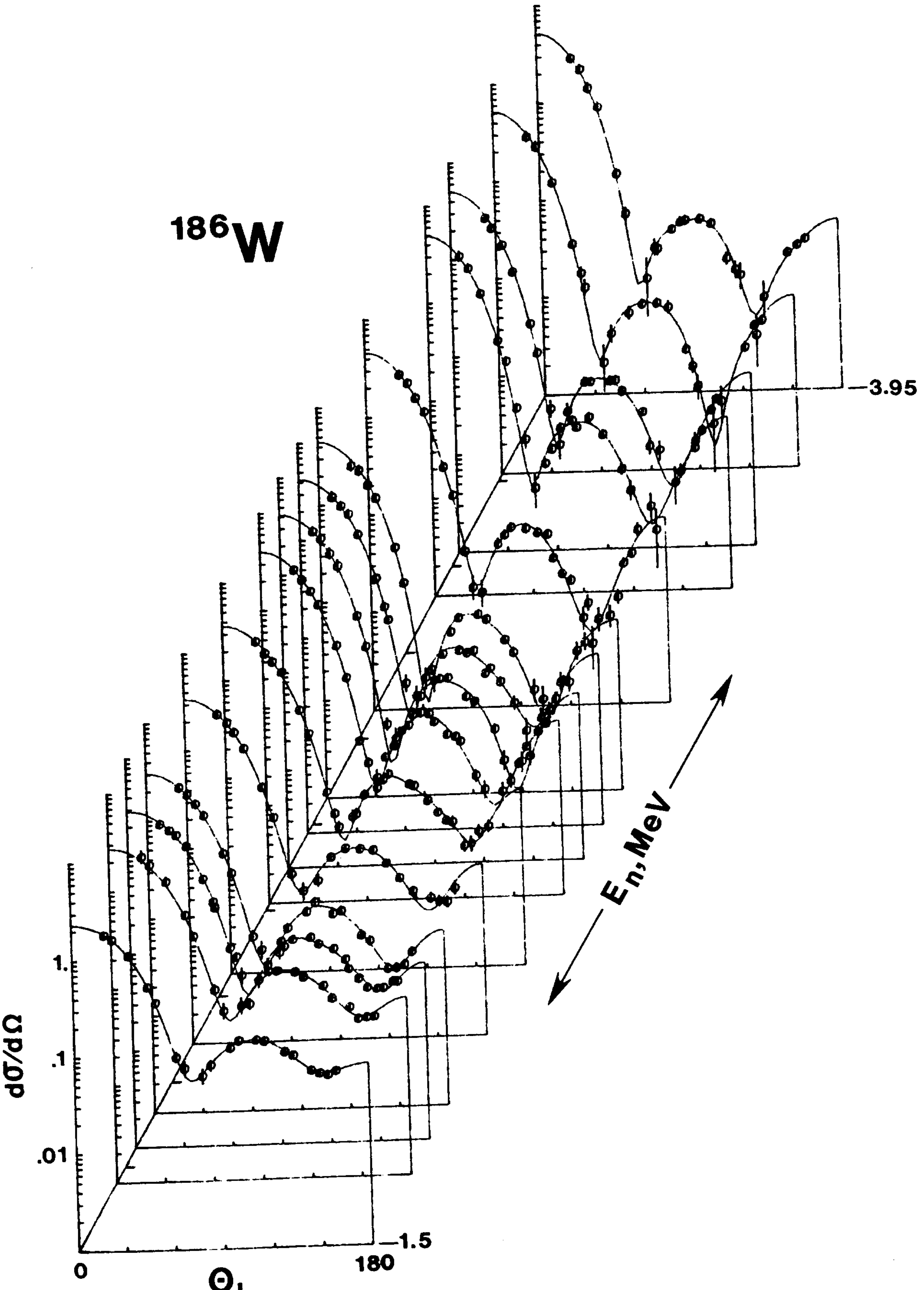


Fig. III-5C.

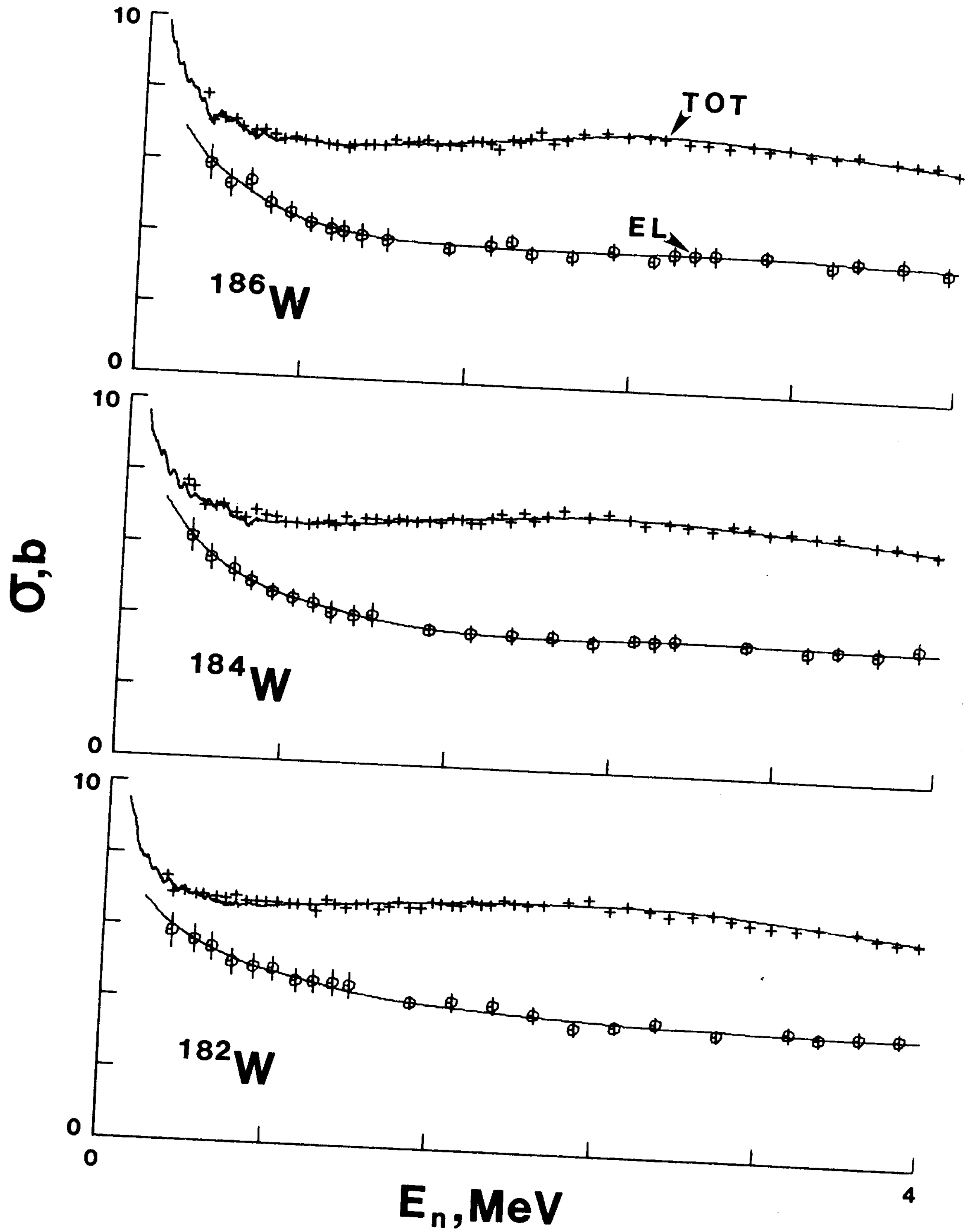


Fig. III-6.

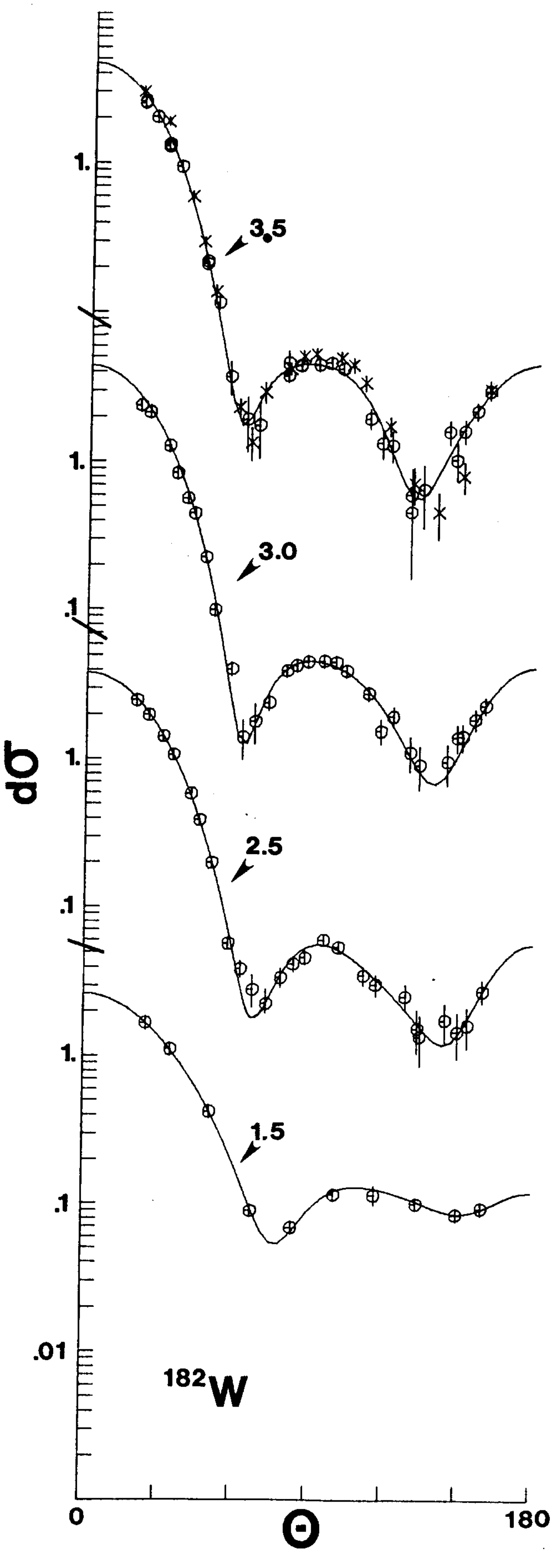


Fig. III-7A.

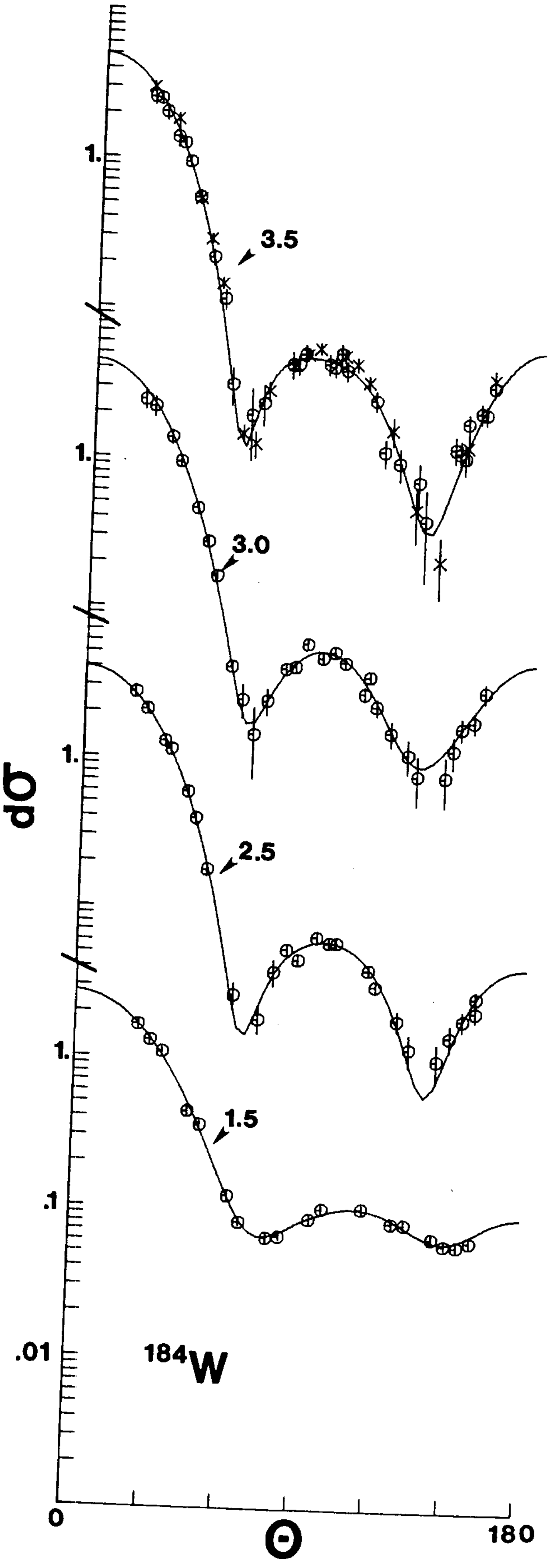


Fig. III-7B.

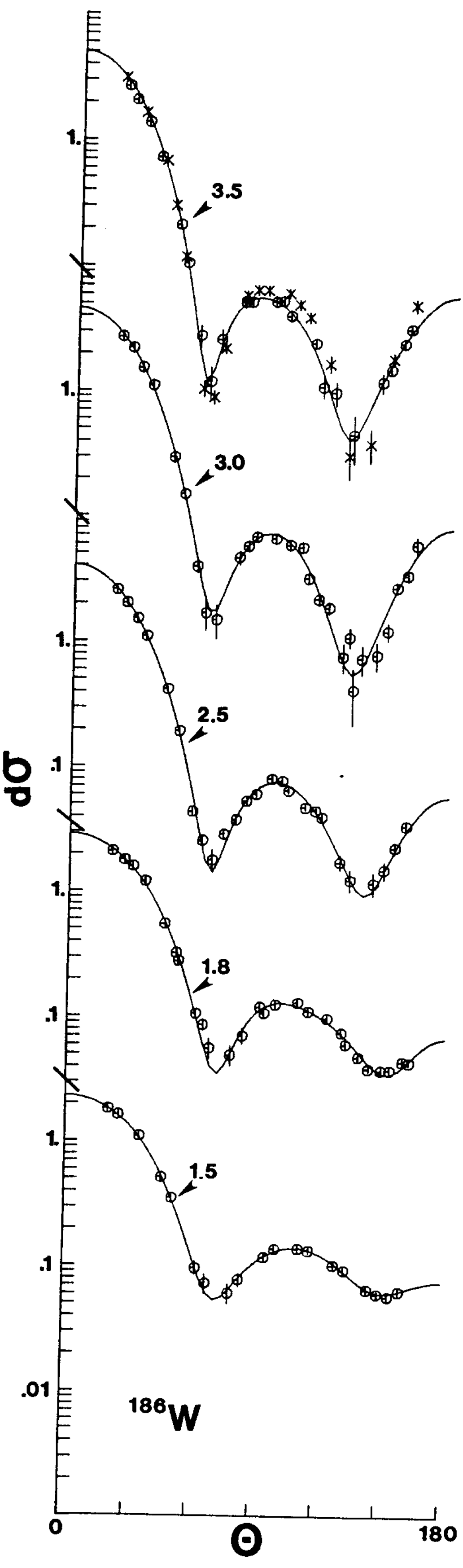


Fig. III-7C.

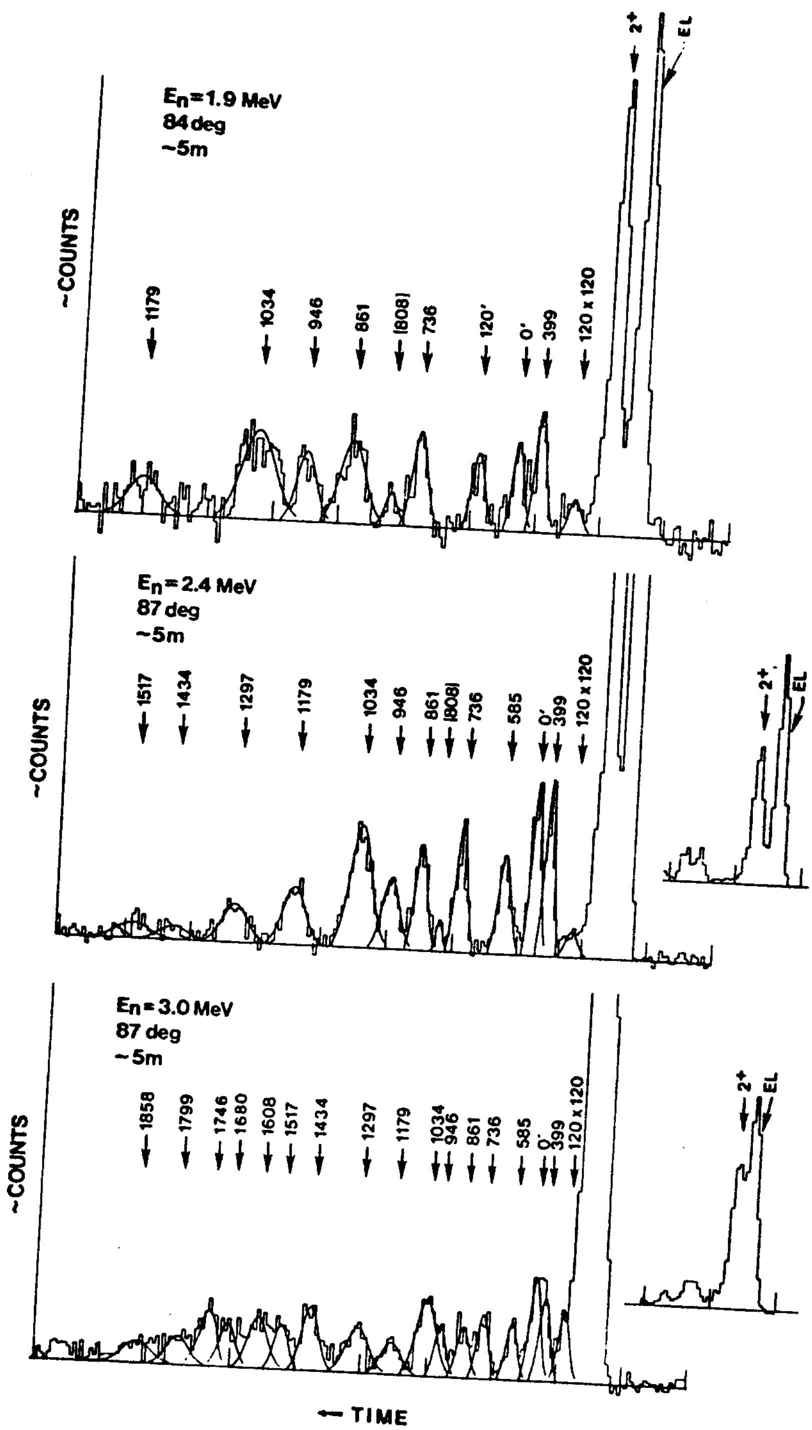
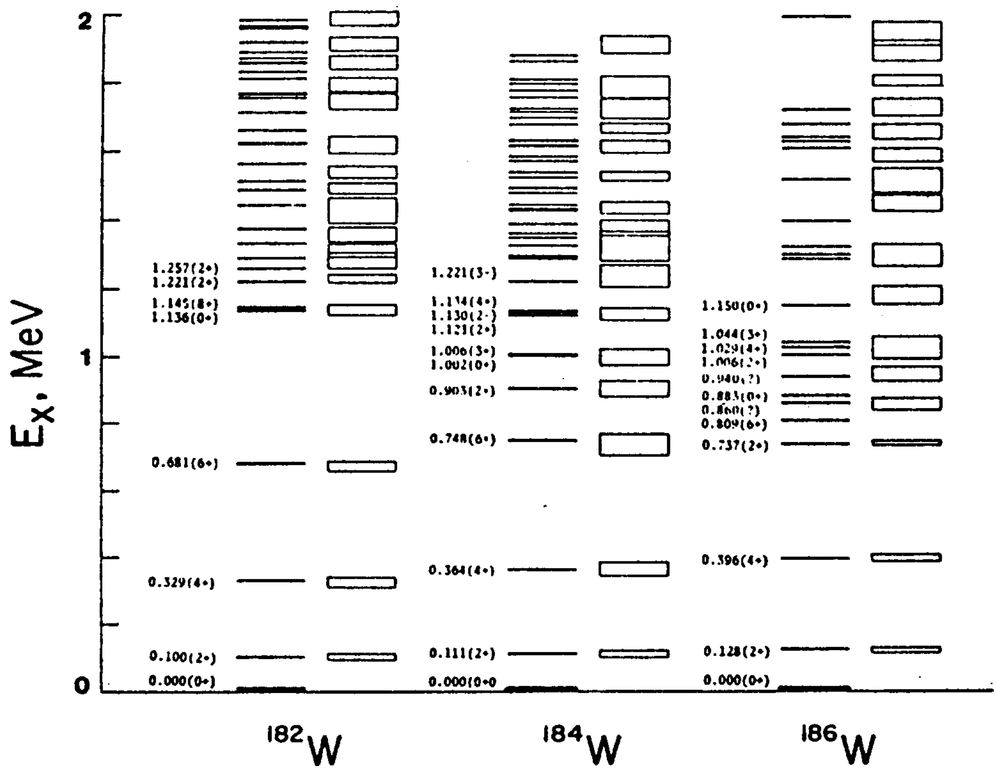

En=1.9 MeV
84 deg
~5m
~COUNTS
1179 1034 946 861 (808) 736 120' 0' 399 120 x 120
2+
EL
En=2.4 MeV
87 deg
~5m
~COUNTS
1517 1434 1297 1179 1034 946 861 (808) 736 585 0' 399 120 x 120
2+
EL
En=3.0 MeV
87 deg
~5m
~COUNTS
1858 1799 1746 1680 1608 1517 1434 1297 1179 1034 946 861 736 585 0' 399 120 x 120
2+
EL
← TIME

Fig. III-8.



2
1
0
E_x, MeV
1.257(2+)
1.221(2+)
1.145(8+)
1.136(0+)
0.681(6+)
0.329(4+)
0.100(2+)
0.000(0+)
1.221(3-)
1.134(4+)
1.130(2-)
1.121(2+)
1.006(3+)
1.002(0+)
0.903(2+)
0.748(6+)
0.364(4+)
0.111(2+)
0.000(0+)
1.150(0+)
1.044(3+)
1.029(4+)
1.006(2+)
0.940(?)
0.883(0+)
0.860(?)
0.809(6+)
0.737(2+)
0.396(4+)
0.128(2+)
0.000(0+)
^{182}W
^{184}W
^{186}W

Fig. III-9.

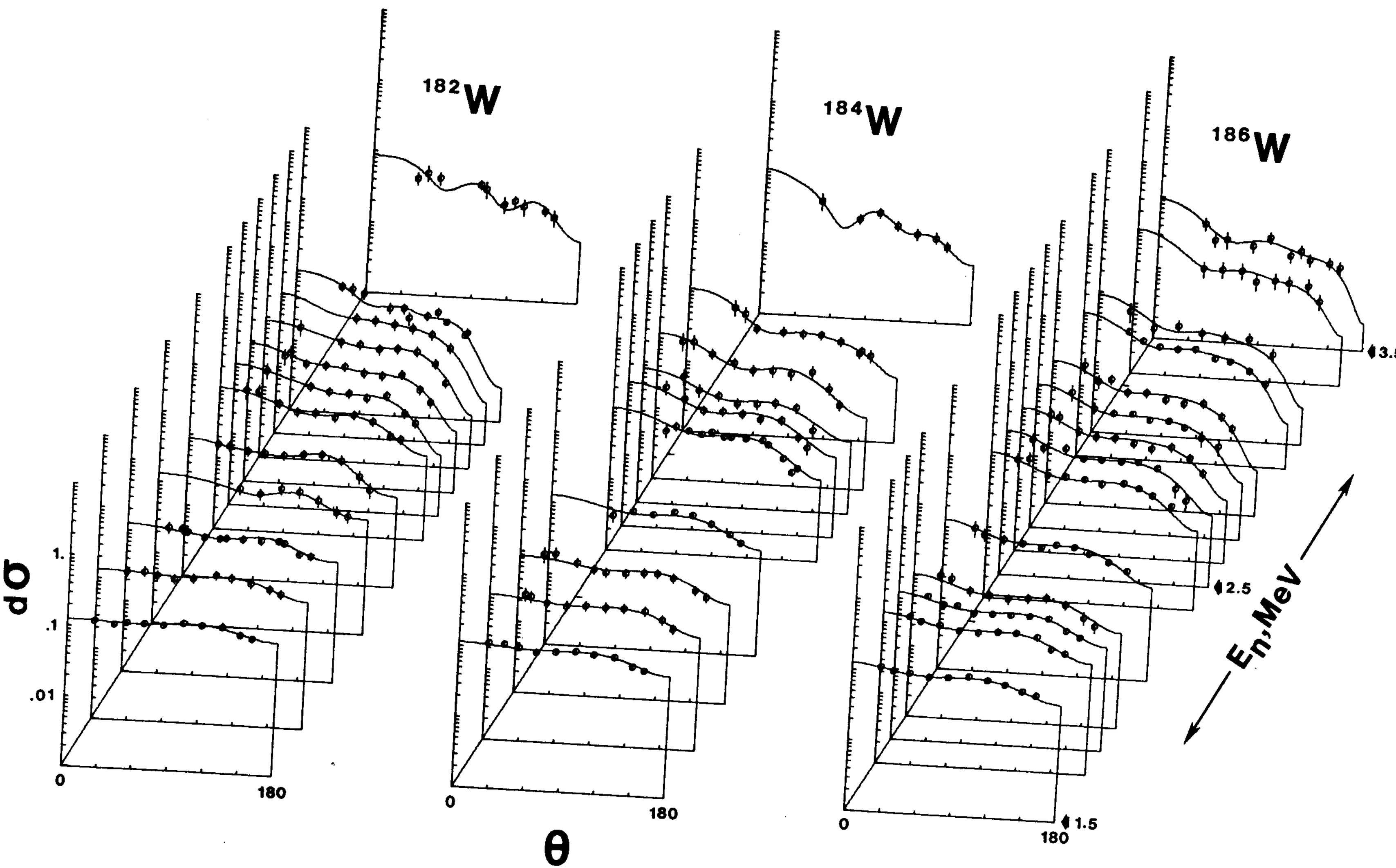


Fig. III-10.

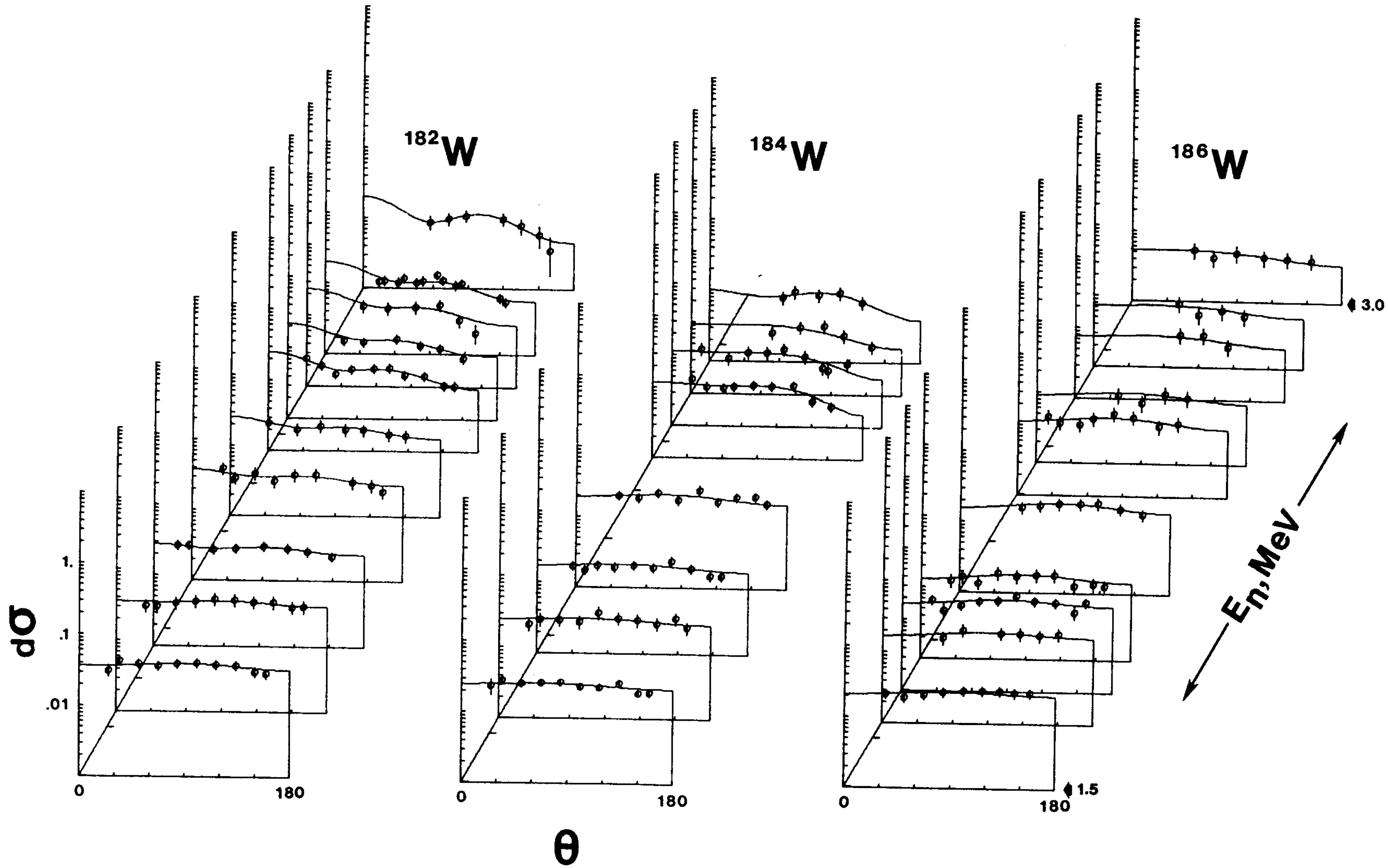


Fig. III-11.

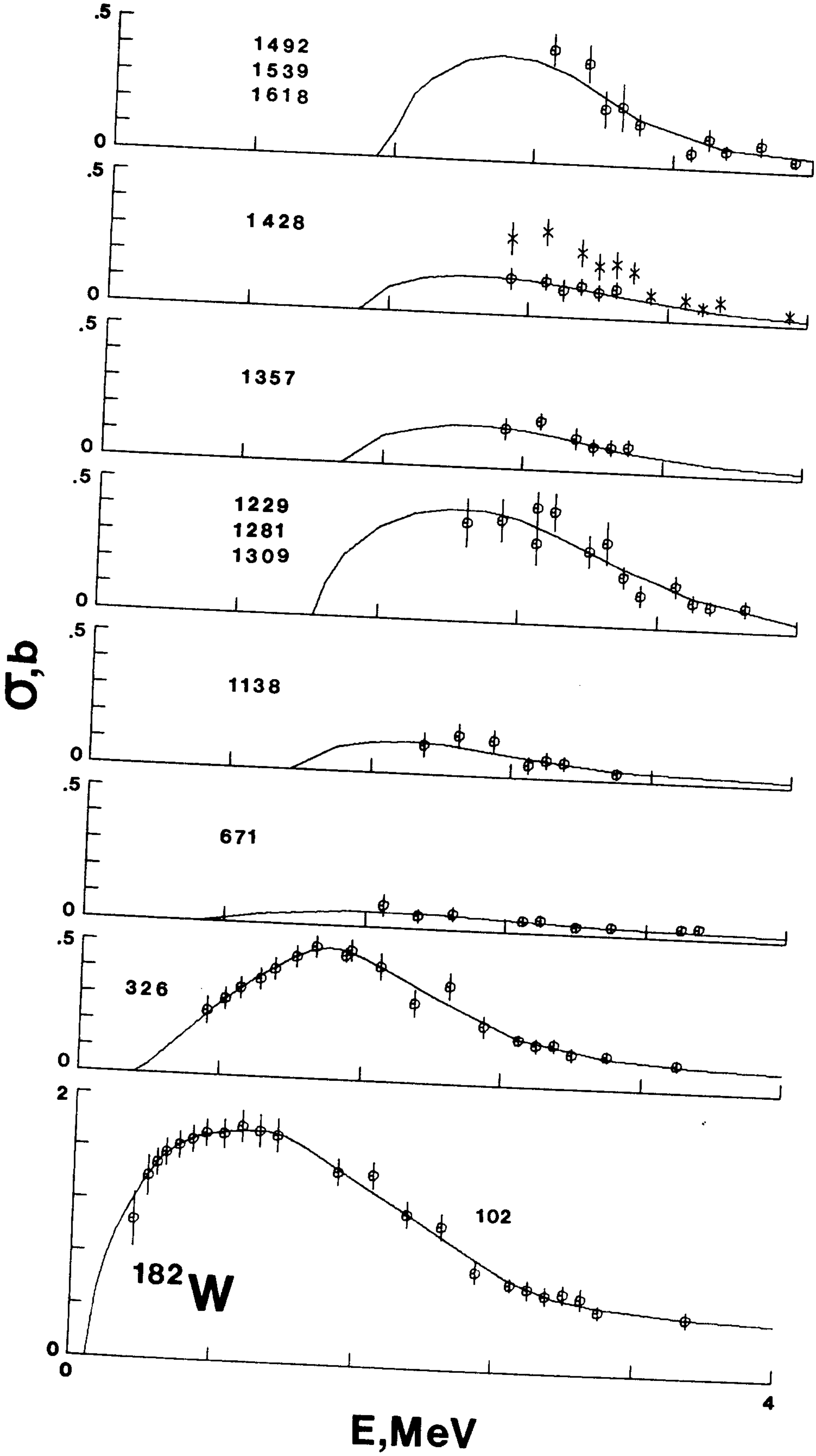

σ,b
.5
0
1492
1539
1618
1428
1357
1229
1281
1309
1138
671
326
2
102
182W
0
4
E,MeV

Fig. III-12A.

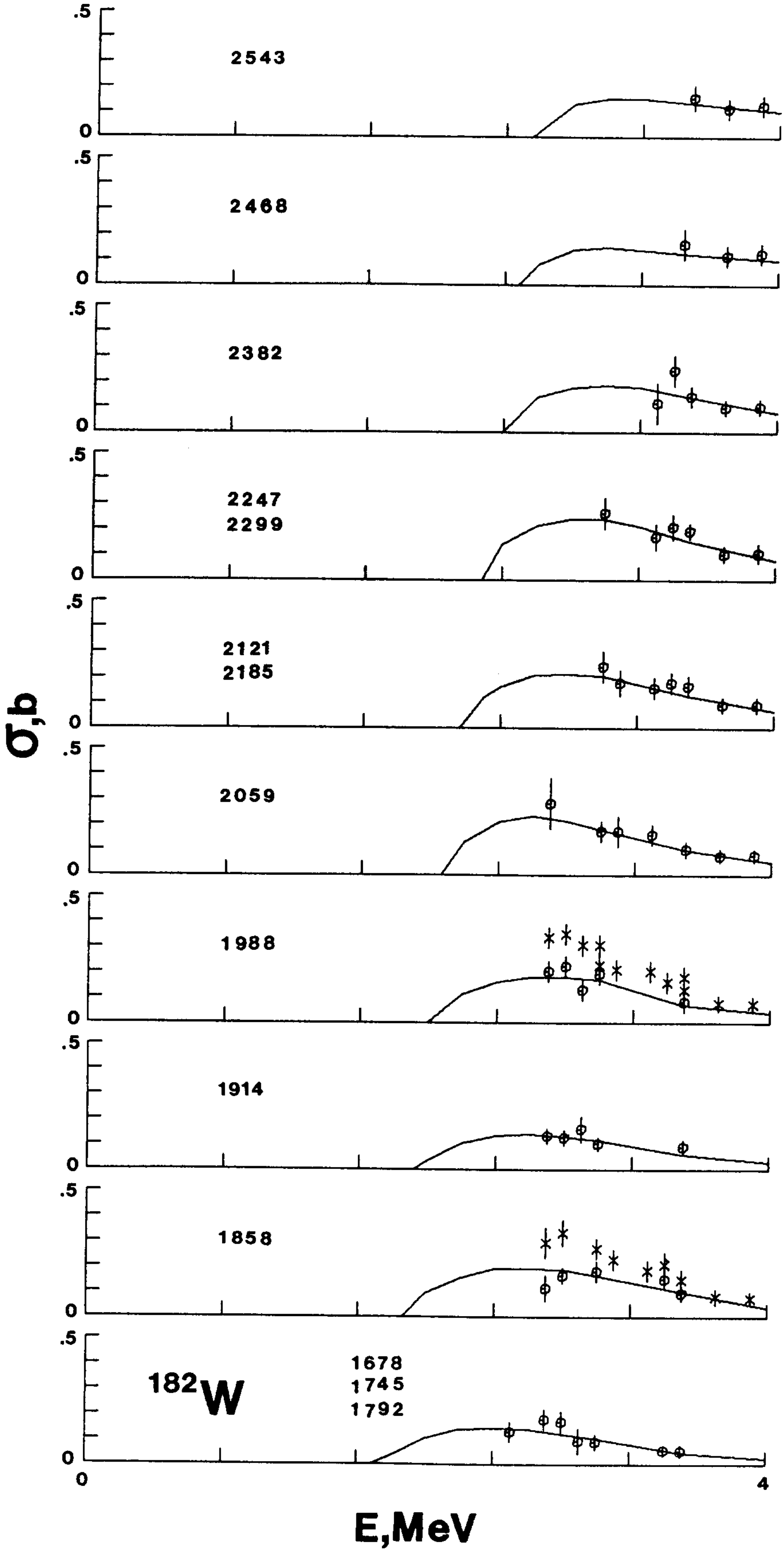


Fig. III-12A (Contd.)

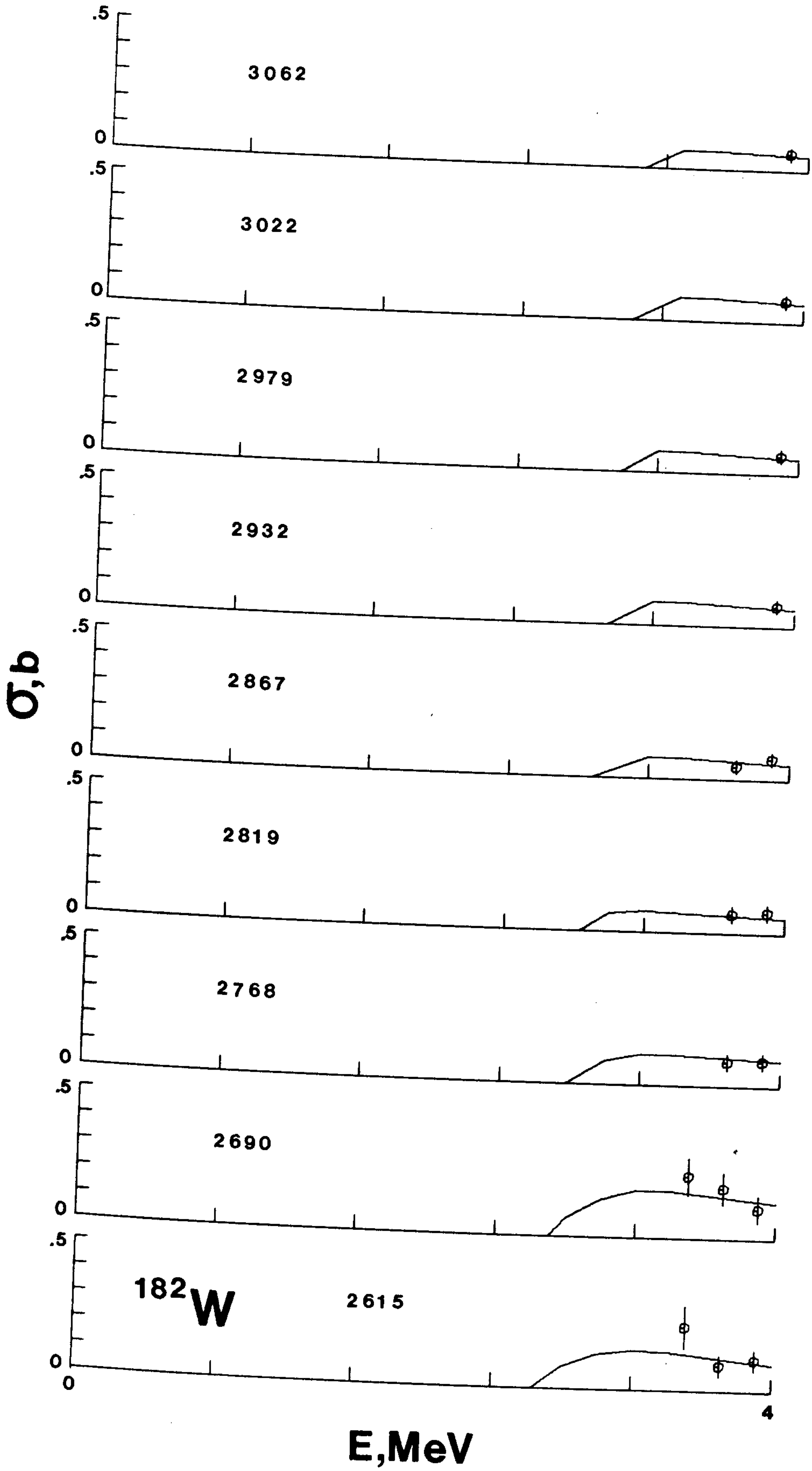


Fig. III-12A (Contd.)

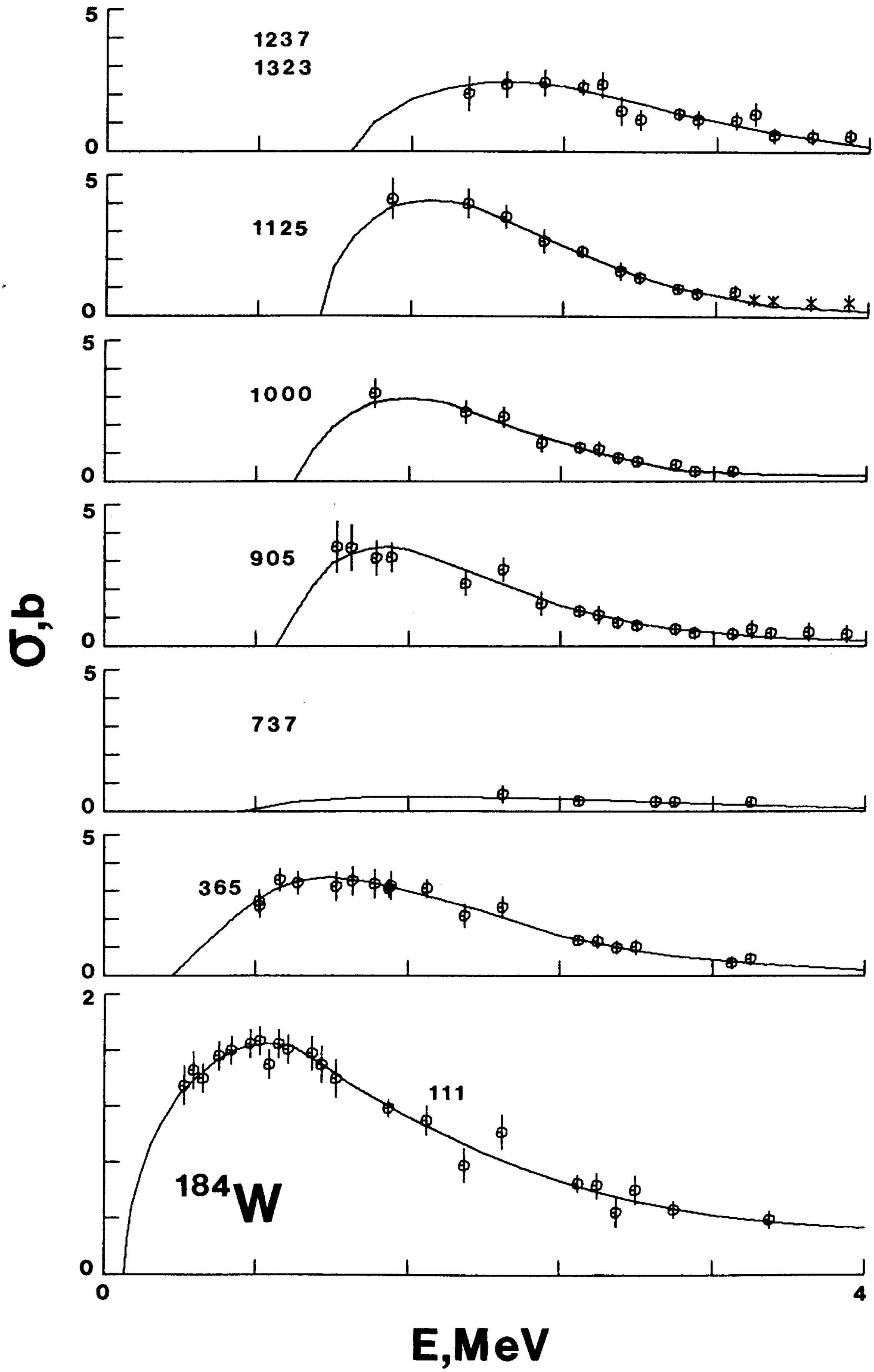


Fig. III-12B.

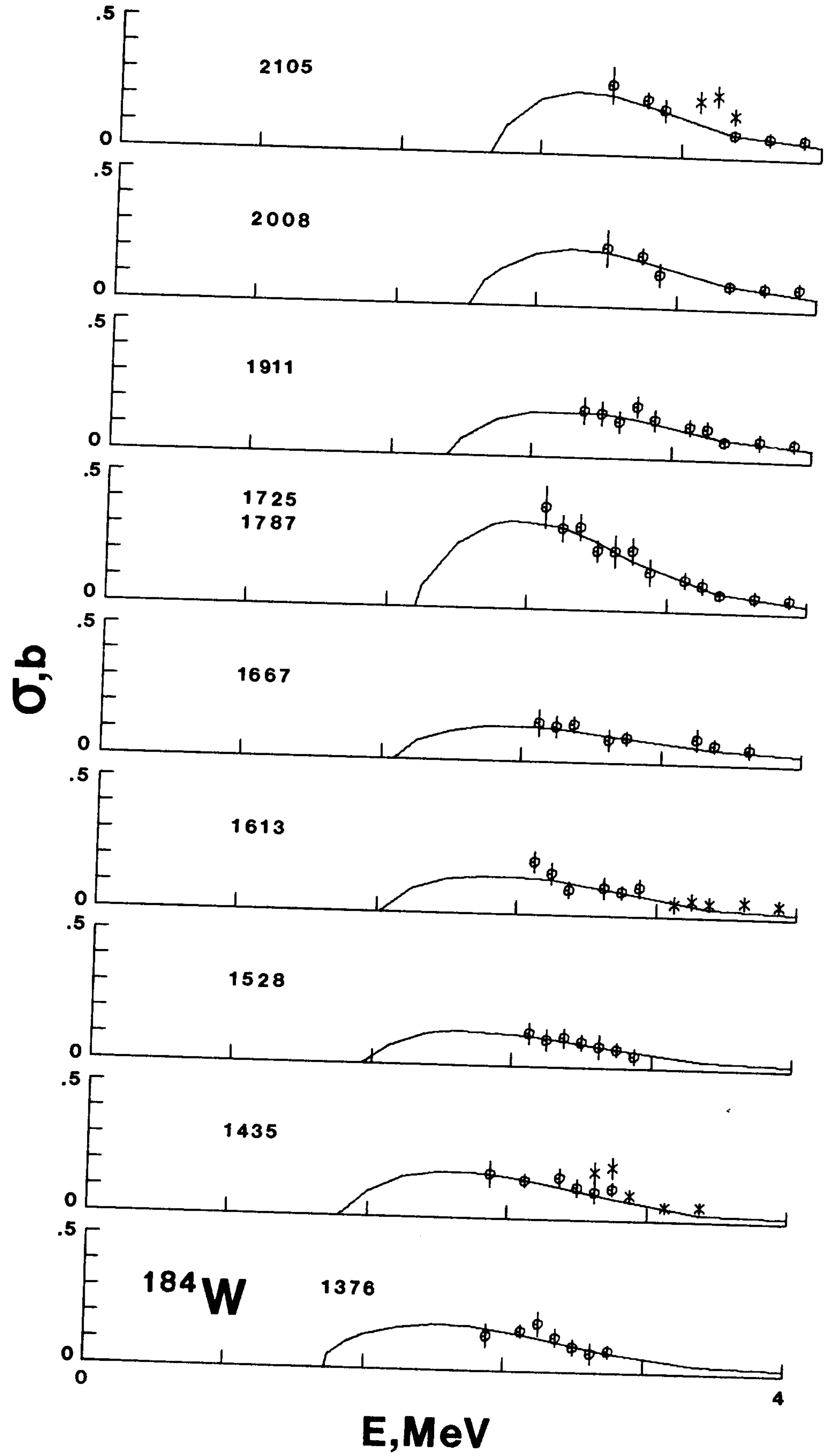


Fig. III-12B (Contd.).

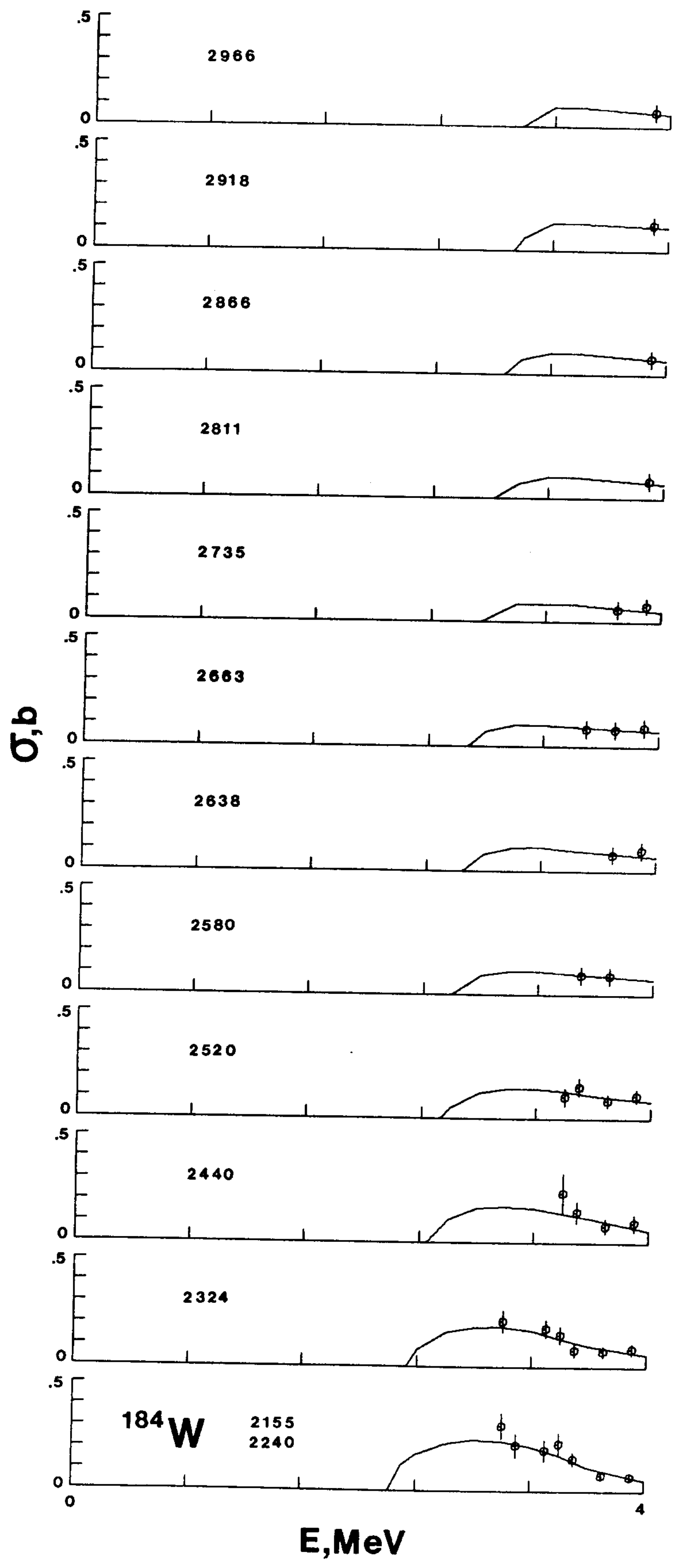


Fig. III-12B (Contd.).

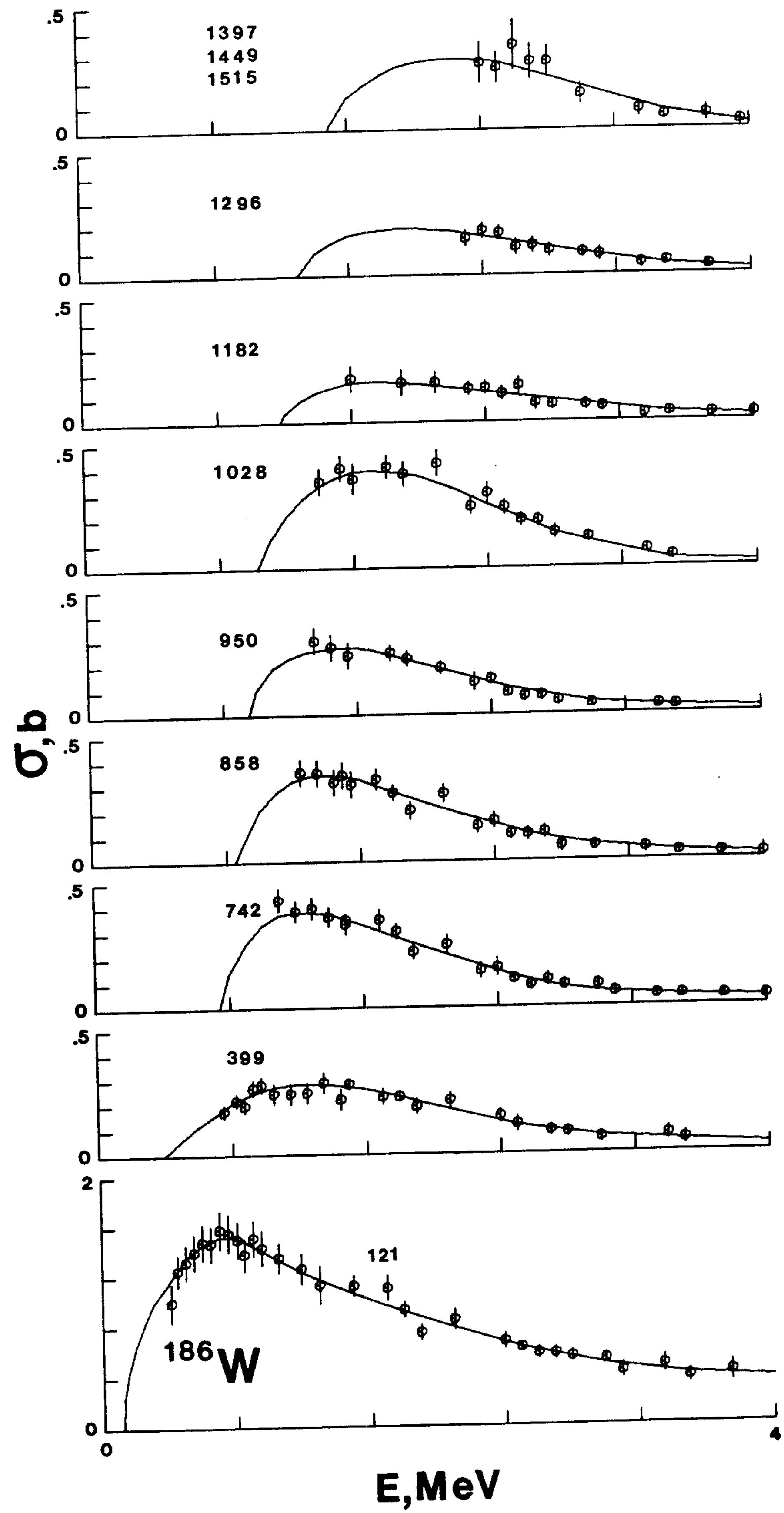

.5
0
1397
1449
1515
1296
1182
1028
950
858
742
399
2
121
^{186}W
σ, b
4
E, MeV

Fig. III-12C.

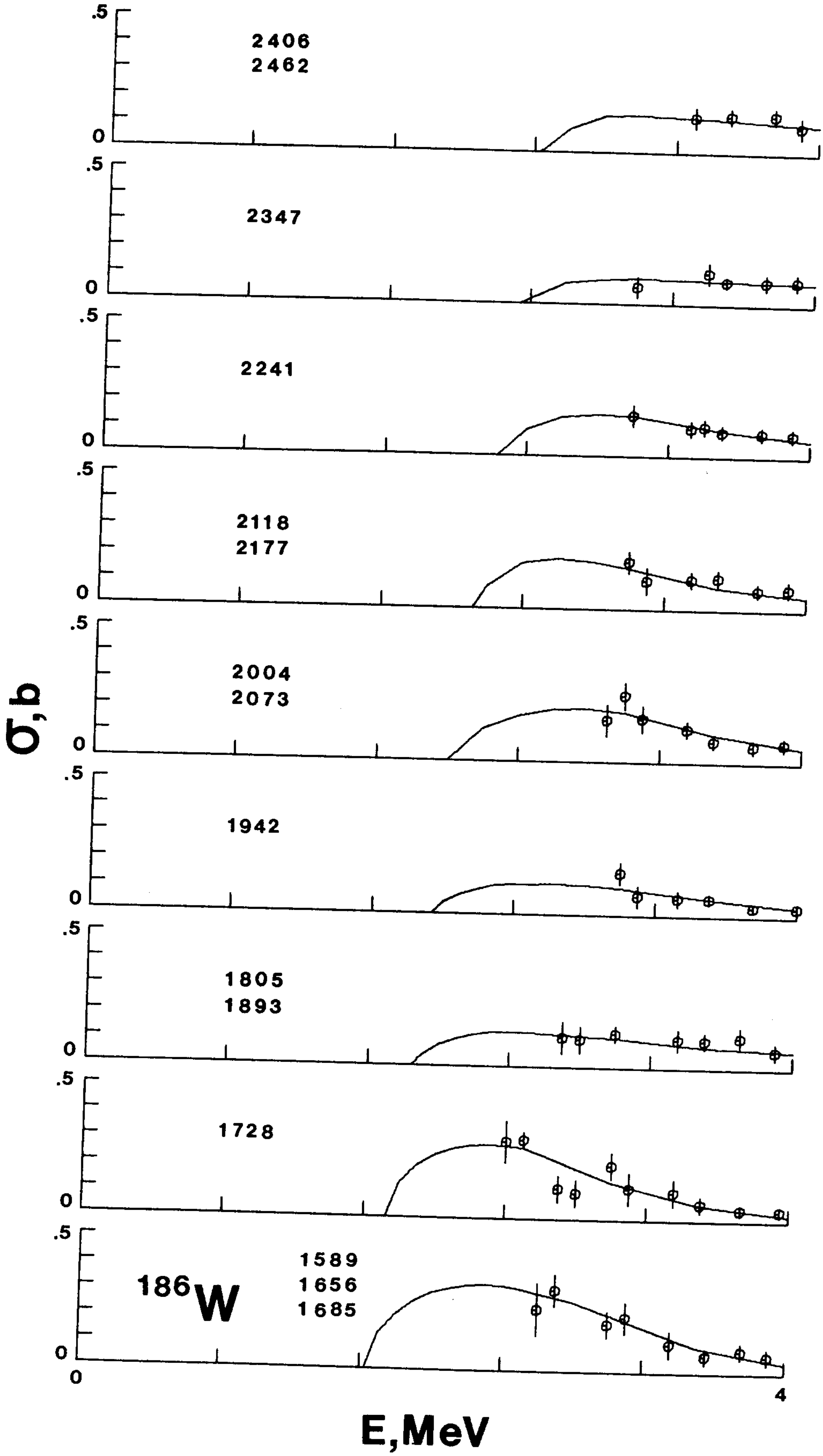


Fig. III-12C (Contd.).

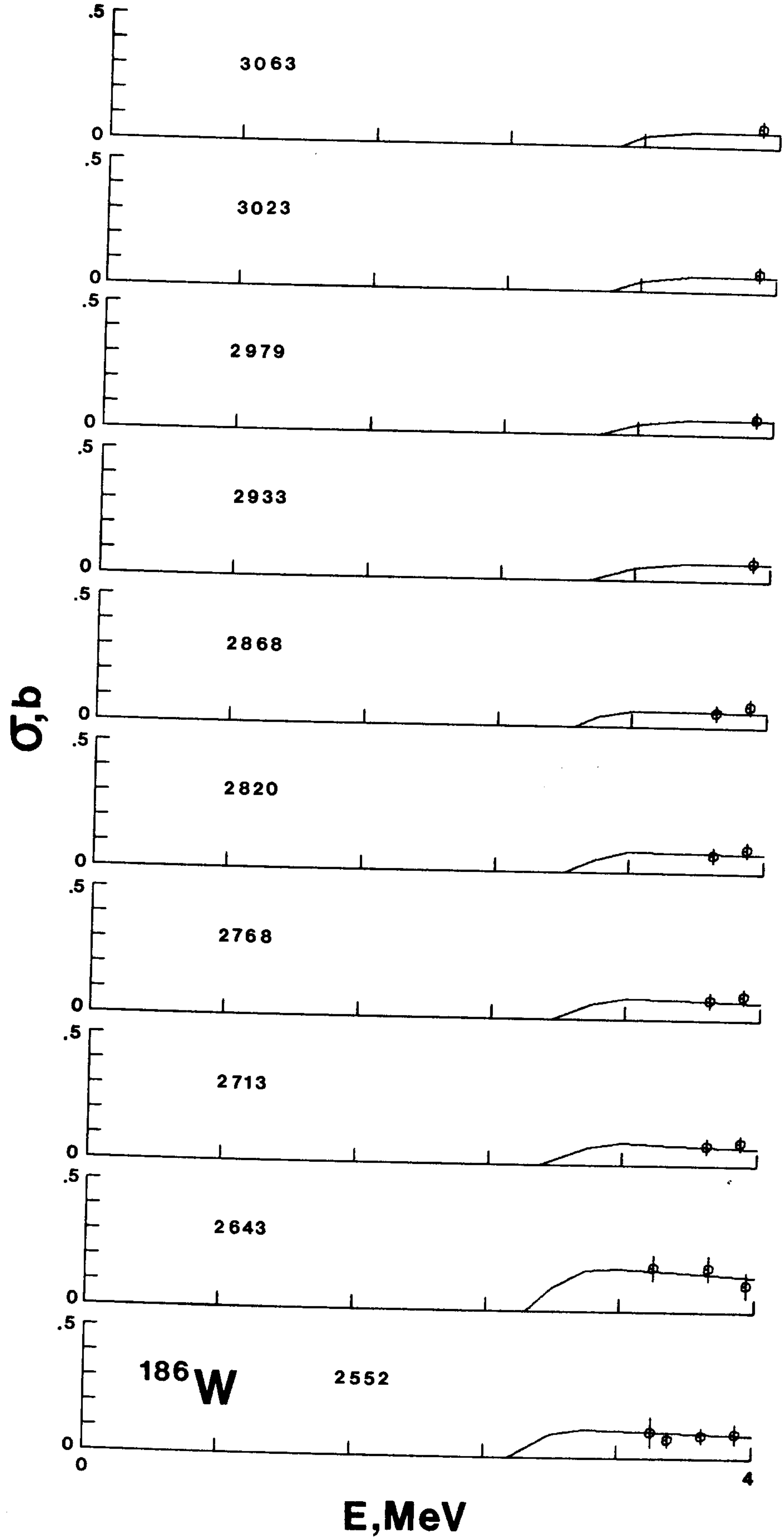


Fig. III-12C (Contd.).

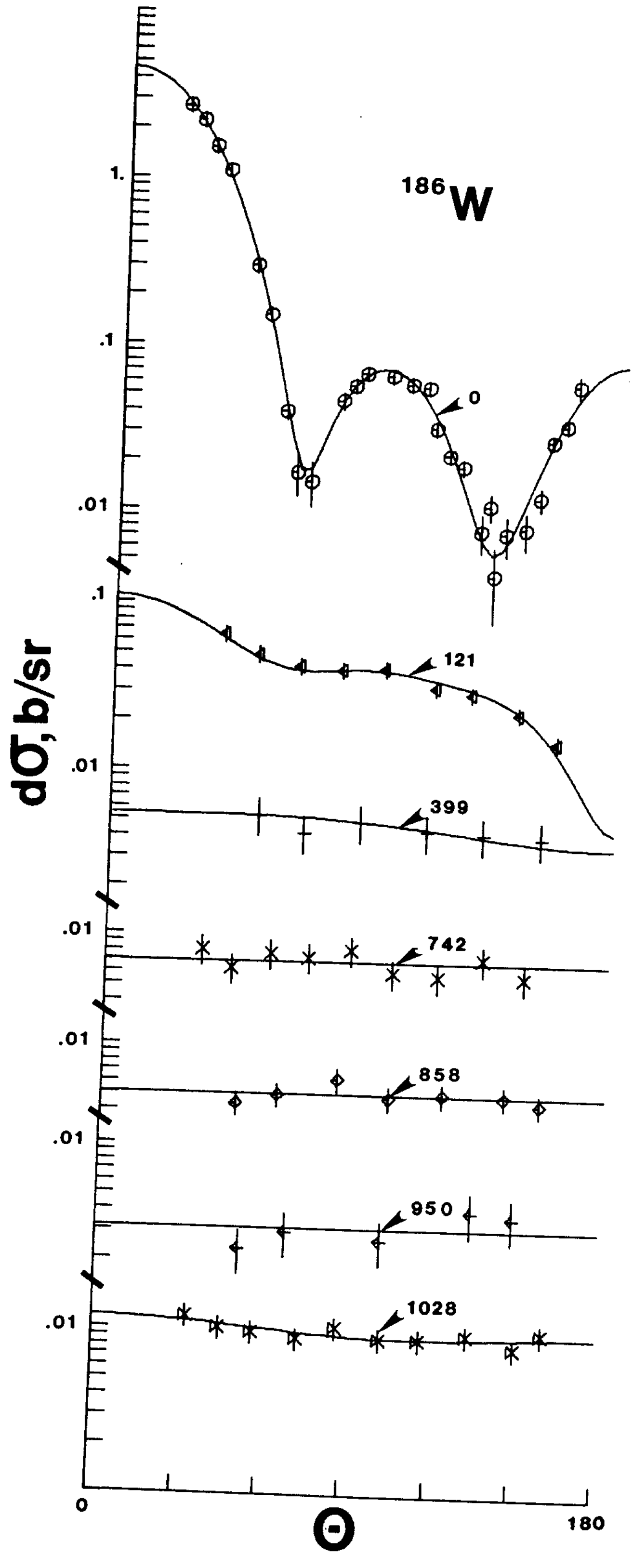


Fig. III-13.

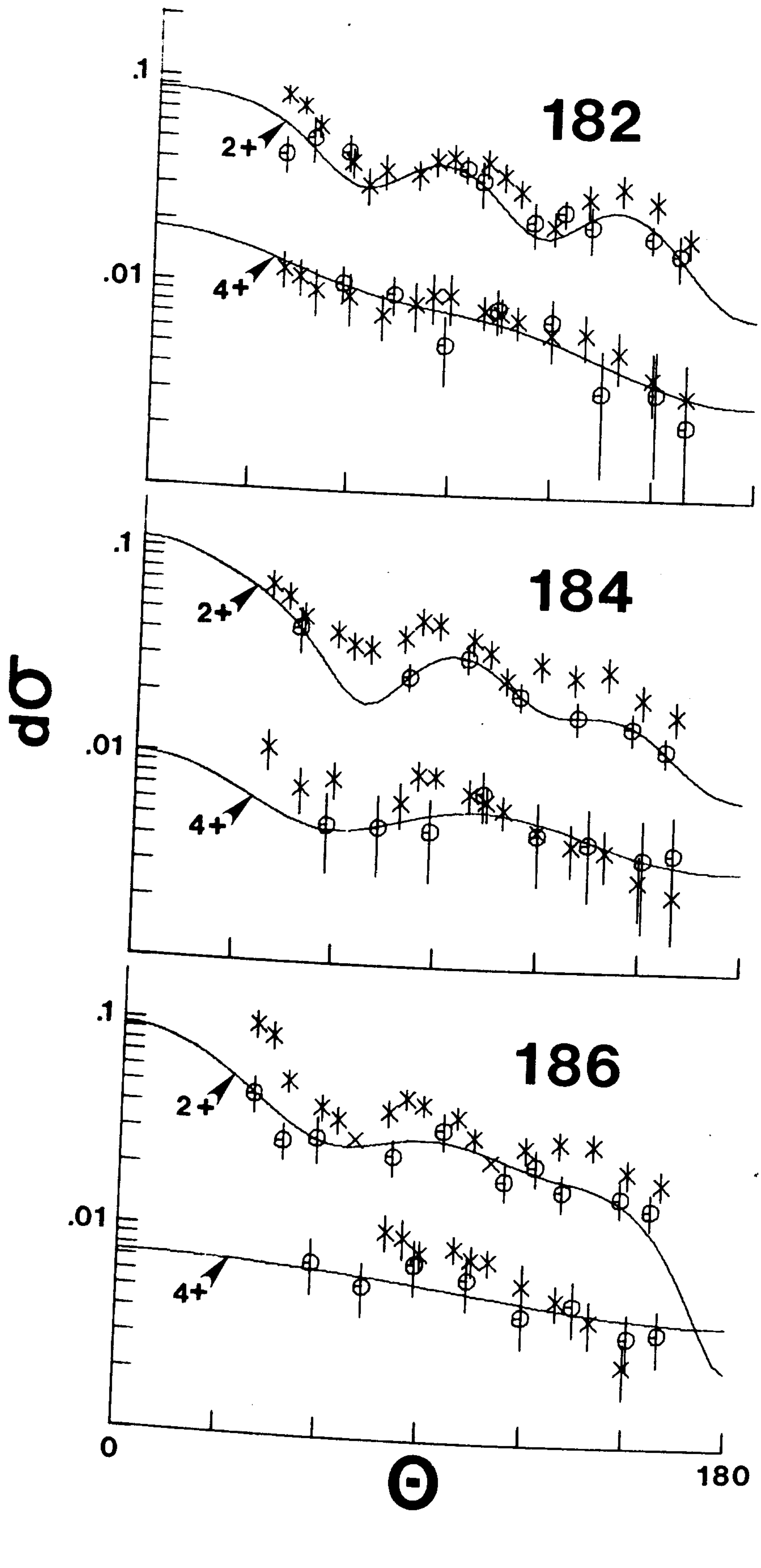


Fig. III-14.

IV. PHYSICAL INTERPRETATION

The objective was a "base" physical model descriptive of the present experimental results and suitable for a subsequent investigation of some of the physical aspects of the measured quantities in the context of that model. The interpretation was based upon the coupled-channels model (IV-1). The neutron cross sections were calculatd using the computational code JUSTSO (IV-2). This code treats the direct reactions in the coupled-channels formalism. It also determines the transmission coefficients from the deformed potential and calculates the compound-nucleus contributions using the Hauser-Feshbach formula with resonance width-fluctuation and correlation corrections (IV-3). The latter correction factors were calculated using the formalism of Moldauer (IV-4) which gives consideration to the enhancement of both elastic- and inelastic-neutron processes in the coupled-channels. The calculations explicitly included the inelastic-neutron excitation of levels to ~1.5 MeV using the energetics, spins and parities of Ref. IV-5. Compound-nucleus competition due to higher-energy levels was approximated using the statistical level-density parameters of Gilbert and Cameron (IV-6). Radiative-capture processes were neglected, an omission that had negligible effect in the context of the present experiments.

The "base" model employed the potential of Delaroche et al. (IV-7), the parameters of which are summarized in Table IV-1. That potential will be shown to be generally descriptive of the present experimental results and it is supported by extensive parameter studies by one of the present authors reported elsewhere (IV-8). In comparing calculations with measured values, the present experimental results were used, extended to lower energies with experimental values previously reported from this laboratory (IV-9). The experimental and calculational comparison followed a hierarchy. First attention was given to neutron total cross sections. They were most accurately measured and are unambiguously calculable. Next, the comparisons gave attention to angle-integrated partial cross sections associated with the ground-state rotational band; i.e. elastic scattering and the inelastic excitation of the first 2+ and 4+ states. These angle-integrated cross sections were well defined by the experiments and easily calculable at low energies where the compound-nucleus contribution can be reasonably determined, and at high energies where the cross sections are essentially due to direct processes. Comparisons of measured and calculated angle-differential cross sections of the ground-state rotational band were considered; however, some such comparisons deal with very small and experimentally uncertain magnitudes. The neutron-excitation of higher-lying levels was calculated using an equivalent spherical potential, but the results were not directly used in judgments of model validity as the contributing structure remained uncertain in many cases, both from the points of view of measurement and calculation. No attention was given to low-energy strength functions as they are experimentally uncertain and their remain questions as to their interpretation (IV-10).

The measured neutorn total cross sections are compared with those calculated from the "base" model in Fig. IV-1. The ^{184}W and ^{186}W results agree to within several percent over the full measured energy range (0.1-5.0 MeV). The agreement is less satisfactory for ^{182}W where the calculated results tend to be higher than the measured values below 1.0 MeV. At low energies the self-shielding corrections to the measured values introduced some uncertainties that may vary from isotope to isotope, but above ~400 keV the corrections are small in all cases and the associated uncertainties are considerably smaller than the above systematic ^{182}W discrepancy. The "base" model gives a good description of the measured angle-integrated elastic-scattering cross sections of all three isotopes over the entire measured energy range as illustrated in Fig. IV-1. For all three isotopes the calculated angle-integrated cross sections for the excitation of the first 2+ states are somewhat larger than experimentally observed at low energies (e.g. by 5-10% below $\lesssim$1.0 MeV). At high energies (e.g. $\gtrsim$3.5 MeV), where the excitations of the 2+ states are essentially entirely due to direct processes, the agreement between calculated and measured values is good. In the intermediate-energy range there are systematic differences that decrease with increasing target mass. Measured and calculated angle-integrated cross sections for the excitations of the first 4+ states are in reasonably good agreement for all three isotopes over the energy range where the cross sections are of appreciable magnitude. There is no anomalous behavior of the 4+ excitations as, for example, reported in the samarium isotopes (IV-11).

The measured neutron differential-elastic-scattering cross sections are generally compared with those calculated from the "base" model in Fig. IV-2, with some more detailed illustrations given in Figs. IV-5, -6, and -7. On the whole, the agreement is reasonably good. There are some isolated discrepancies, notably in the extreme minima of the distributions. The latter are probably of experimental origin, possibly associated with small experimental-angle uncertainties and/or inappropriate multiple-event corrections in regions where those corrections are very large (IV-12). If there is a systematic discrepancy, it is in the description of ^{182}W elastic scattering in the mid-angle-energy range where the calculated results are systematically larger than the measured values.

General comparisons of measured and calculated neutron differential cross sections for the excitation of the first 2+ and 4+ states are shown in Figs. IV-3 and 4 with some more detailed illustrations in Figs. IV-5, 6 and 7. The calculated and measured relative shapes are generally very similar. There is a tendency for the calculated magnitudes, particularly of the 2+ excitations, to be smaller than the measured values at lower energies where the compound-nucleus contribution to the cross section is relatively large as noted above. The differential cross sections for the excitation of the 4+ states are relatively very small (a few milli-barns per steradian) and, as a consequence, the experimental uncertainties are large making detailed model comparisons less rewarding, particularly at higher energies.

These three isotopes of tungsten are spectroscopially quite different. Each is statically deformed with a characteristic ground-state-rotational band. This is followed by beta- and gamma-vibrational bands. In ^{182}W the beta-vibrational band head is somewhat above 1.0 MeV followed, at higher energies, by the gamma-vibrational-band. As the target mass increases the gamma-vibrational-band energy decreases, crosses the beta-band, to a relatively low energy of ~0.75 MeV in ^{186}W. These characteristics are evident in Ref. IV-5, outlined in Fig. III-9 and discussed in some detail in Ref. IV-8. Even within this general band framework there are uncertainties, e.g. the results of recent (n;n', gamma) measurements are not entirely consistent with the level structure of ^{186}W as reported in the compilation of Ref. IV-5 (IV-8). These large changes in collective structures have possible implications on the direct interactions associated with the present interpretations as discussed below. Even in the simpler context of compound-nucleus reactions the situation is complicated by the realities of experimental resolutions which preclude the explicit determination of the cross sections associated with isolated levels at excitations much above 1.0 MeV and by uncertainties associated with the underlying structure itself.

The calculation of cross sections for excitations above the ground-state rotational band generally assumed the correlation between observed and underlying structure outlined in Table IV-2 and that the cross sections were due entirely to the compound-nucleus process. Possible direct-reaction contributions are discussed below. The calculated results are compared with the measured values in Figs. IV-8, 9 and 10. Generally, the agreement between measurement and calculation is better for the lower-energy excitations and the heavier target masses. There is a trend, also evident in the excitation of the ground-state rotational bands shown in Fig. IV-1, for the calculated results to be smaller than the measured values in the mid-energy regions and increasingly so for decreasing target mass. The differences are most evident in ^{182}W where more reliance had to be placed upon statistical level distributions in the calculation of compound-nucleus channel competition. These considerations suggest that for these particular targets and this energy range the level density model of Gilbert and Cameron results in excessive channel competition. Similar problems have been encountered in other mass regions at approximately the same excitation energies (IV-13). The situation can be considerably improved by adjusting the level density parameters in such a way as to reduce channel competition but such adjustment is largely pragmatic and thus was not pursued here. It was concluded that the simple statistical representation of Ref. IV-6 was an over-simplification in the present context which generally resulted in the calculation of significantly too small compound-nucleus cross sections over much of the mid-energy range of the present measurements.

Beyond the general impressions, above, there are some specific characteristics evident in Figs. IV-8, 9 and 10. The calculated excitations of the first 6+ states are all smaller than the measured values; e.g. those for the 671 keV level of ^{182}W. However, the cross sections are very small (few milli-barns per steradian) and it is likely that they were over estimated in the measurements. The calculated values for the weakly excited ^{182}W beta-band head at 1138 keV are reasonably consistent with the measured values. The observed strong excitation of levels at 1.2-1.3 MeV in ^{182}W is due to several 2+ levels and the calculations are reasonably consistent with the limited experimental results. It is difficult to correlate measured and calculated excitations in ^{182}W above ~1.3 MeV and it seems likely that there were a number of additional components contributing to the measured values not included in the calculational model. The comparisons of measured and calculated excitations in ^{184}W and ^{186}W are somewhat analogous and in both the agreement tends to be better than for ^{182}W. This is particularly so for ^{186}W where the levels are reasonably known and where the experimental definition is good to ~1.0 MeV.

One conspicuous calculational shortcoming arises for the 1182 ± 26 keV excitation in ^{186}W. It will serve to illustrate computational difficulties encountered in the quantitative representation of higher excitations in these isotopes. The state in question has been observed at this laboratory in a number of measurements over a period of years and gross errors in excitation energy as well as cross section magnitude seem unlikely. Although somewhat outside the excitation energy error, the known level at E_x = 1150 keV, $J^\pi = 0^+$ (Ref. IV-5) appears to be the most plausible identification. However, the cross sections calculated using this spin are roughly a factor of two below the experimental values (see Fig. IV-10). Consideration of the 4^- member of the octupole-vibrational band, expected to lie near this energy, does not improve the calculated result. These observations suggested the inclusion of a 2^+ level at approximately 1180 keV and this approach met with success (see Ref. IV-8). Indeed, recent interacting-boson model calculations (Ref. IV-16) suggest a 2^+ level at 1156 keV with small B(E2) coefficients for transitions from this state to both the E_x = 122 keV, $J^\pi = 2^+$ level and the ground state. On the other hand, preliminary study of gamma-rays emitted following fast-neutron bombardment of ^{186}W by one of the authors (P.T.G.) indicates a strong transition from a surmised 1153 ± 2 keV level to the 122 keV (2^+) level, while no companion ground state transition was found. This observation favors the $J^\pi = 0^+$ assignment. Further, no suitable transitions could be identified to justify the assumption of the postulated 2^+ level near 1180 keV. Hence there appears to be no satisfactory explanation at this time for this apparent discrepancy between calculation and experiment.

It is not attractive to attempt to extend the comparisons of measured and calculated cross sections to levels above ~1.5 MeV excitation energy. The observed inelastically-scattered neutron groups very likely consist of contributions from a number of poorly defined levels, the properties of which are essentially unknown. It is also doubtful that spectroscopic information can be reasonably construed from the present experimental results for levels much above ~1.0 MeV excitation energy because of the same shortcomings in experimental definition and knowledge of underlying level structure.

As noted above, the "base" model does not properly describe the observed neutron total cross sections of ^{182}W at lower energies. This is disturbing as these cross sections are among the more reliable of calculated and measured quantities. Assuming the general validity of the model, one seeks parameters unique to ^{182}W for the origin of the discrepancy. Prominent of these are the quadrupole and hexadecapole deformations. Elastic-scattering distributions are very sensitive to the choice of beta-4, as discussed in Ref. IV-8, and appreciable variations in this parameter are not attractive. An alternative is the quadrupole deformation, which if reduced from the value of 0.223 given in Ref. IV-7 to ~0.205 (a value essentially the same as that of the other two isotopes) considerably improves the calculated description of the low-energy total cross sections of ^{182}W as illustrated in Fig. IV-11. Concurrently there is a marginal improvement in the description of the cross sections for the excitation of the first 2+ state in ^{182}W. The description of large angle elastic scattering is also improved but at some compromise of the agreement with the measured values in the mid-angle range as illustrated in Fig. IV-12. These observations, based essentially upon comparisons of measured and calculated total cross sections, could suggest that the quadrupole deformation of ^{182}W is less than given in Ref. IV-7 and the recent compilation of Ref. IV-14. This suggestion is speculative and not consistent with other experimental evidence or the notion that the tungsten isotopes lie in a region of transition from deformation to sphericity. Perhaps it reflects some other aspects of collective deformation such as alternate coupling schemes or higher-order deformations not addressed in the above calculations.

The above calculations employed the width-fluctuation and correlation enhancement correction factors defined by Moldauer (IV-4). These correction factors use a channel degree of freedom of $\nu \approx 1.8$ resulting in an elastic enhancement factor of ~2.1. The values are very sensitive to the statistical assumptions both as regards resonance pole-residue amplitudes and pole spacings. Alternate choices of ν are possible and the choice can significantly effect the cross section calculations involving appreciable compound-nucleus components. This sensitivity was examined by assuming $\nu = 1.0$ and repeating the above calculations in regions where the compound-nucleus contribution is large. The results are indicated by the "C" curves in Fig. IV-1. In the low-energy, few-channel region the enhancement of the elastic scattering cross section increases but the values remain consistent with the experimental results to within the measurement uncertainties. Concurrently, the calculated cross sections for the prominent excitations of the first 2+ states are reduced by 5-10% bringing them into better agreement with the measured values. Other illustrations of the effect of the choice of ν are given in Ref. IV-8. The choice of parameters underlying the correction factors is not, a priority, readily determined and yet it can significantly effect the calculated result. Thus, the capability to quantitatively calculate compound-nucleus cross sections remains appreciably predicated on the pragmatic adjustment of correction parameters to achieve agreement with experimental values.

The possibility of direct-reaction contributions to the inelastic excitations beyond the ground state rotational band (GSRB) was explored. Before entertaining these considerations it should be immediately pointed out that the proper investigation of coupling schemes beyond the GSRB requires a detailed redetermination of all optical model parameters. This massive effort was judged not to be justified at this time for a number of reasons. For example, it will be shown below, that the perturbations to the GSRB caused by these higher-order couplings, while not negligible, are nevertheless small. Further, an exacting definition of the new parameters associated with the various relevant coupling schemes often requires a precision and scope of experimental data beyond that realized in this work. (Examples of useful additional information are the resolution of close-lying members of different rotational bands and the definition of inelastic-neutron angular distributions outside the present angular range, i.e. at very small and very large angles.) In view of these limitations it would appear reasonable to use the base-model parameterization to qualitatively estimate the extent of vibrational-rotational-coupling in inelastic-neutron excitation. The results so derived must be considered qualitative or even speculative.

In terms of cross section magnitude and angular distribution definition the most favorable subject for discussion in the present data set is the gamma-vibrational band (GVB) head in ^{186}W (E_x = 738 keV and $J^\pi = 2^+$). Its excitation function is identified in Fig. IV-10 by the observed E_x = 742 keV. As the figure shows, the calculated compound nuclear (CN) cross section is consistently smaller than that observed experimentally above E_n = 1.5 MeV. While a compound-nucleus correction factor can be invoked to partially explain this shortcoming, (see above remarks), the addition of a direct reaction (DR) component, can also be considered. Support for this contention may be found in the angular distributions of neutrons scattered from this state. In Fig. IV-13 the distributions at E_n = 2.5 MeV are depicted for three neighboring inelastic excitations, identified by average experimental excitation energies. They are the GVB head at 742 keV, the octupole-vibrational band head at 950 keV and the composite group at 858 keV consisting of the second GVB member (E_x = 862 keV, $J^\pi = 3^+$) and the beta-vibrational band (BVB) head (E_x = 882 keV, $J^\pi = 0^+$). These distributions (as well as those shown in Fig. IV-15) are composites of many distributions obtained over several years. In order to retain as much shape information as possible, they were arbitrarily normalized before combining and interpolating to a standard angle set. The resultant averaged distributions were then renormalized to the smoothed, energy-averaged integral cross section implied by the data of Fig. IV-10. The curves labelled "C" in Fig. IV-13 are the CN shapes derived from spherical statistical-model calculations discussed in the beginning of this section. They have been scaled to best fit the data and thus indicate their ability to represent the angular distributions. They do reasonably well for the 858 and 950 keV excitations but are obviously not sufficiently anisotropic in the case of the GVB head. The curves labelled "C + D" contain DR components, as explained below, and conform better with the shapes suggested by the data.

In calculating the angular distributions for the various vibrational band excitations it was assumed, as before, that the DR and CN components were separately calculable. The CN shapes were taken from the spherical calculations described above. The DR components were computed with JUSTSO (Ref. IV-2) employing two coupling schemes:

Case A: GSRB $(0^+,2^+,4^+)$ + GVB $(2^+,3^+)$
Case B: GSRB $(0^+,2^+,4^+)$ + GVB $(2^+,3^+)$ + BVB (0^+).

The actual states coupled are indicated parenthetically by their respective spins. The coupling-strength parameters, η, (see Ref. IV-15) required for each vibrational band were treated as empirical parameters. An example of the coupled-channels calculations is shown in Fig. IV-14. Case A employed η_{GVB} = 0.1, while case B employed η_{GVB} = 0.2 and η_{BVB} = 0.1. Part (b) shows the resultant DR components for the vibrational bands. The shapes for the GVB 2^+ state are rather similar and, when diluted with the CN shape, they clearly strain the analyzing power of the available data. Part (a) indicates the attendant perturbations to the GSRB. These correspond to relatively small variations in optical model parameters (see Ref. IV-8). For example, a 25% change in β_4 could correct much of the deviations exhibited by DR components of the 0^+ and 2^+ angular distributions. The corresponding change in the total cross section is ~1%. Furthermore, changes such as that of the 2^+ member of the GSRB are easily marked by uncertainties in the width-fluctuation correction as noted above. However, in the end, the feasibility of these parameter adjustments must be judged with all relevant data in mind.

The superposition of the DR and CN components was effected by simultaneously adjusting their amplitude to the data in the least-squares sense. This seemingly ad-hoc procedure can be justified with respect to the DR component by noting that small variations in the coupling strength η primarily affect the angular distribution magnitude rather than its shape. The procedure was carried out for the GVB head at several energies between E_n = 1.8 and 3.0 MeV and gave multipliers for the CN and DR components that were consistent to ~±10% with the exception that at 1.8 MeV where the CN multiplier was considerably larger than unity (i.e. 1.3) for both cases. In addition the multiplier for the DR component of case A showed a decrease with energy as already observed in Ref. IV-8. This initial assay implied coupling strengths for case A ranging roughly from ≈0.13 to 0.06, while for case B a constant η_{GVB} ≈0.15 was adequate. These values should be taken with considerable reservation in view of the crudeness of their derivation. Nevertheless, coupled-channels calculations were repeated for these coupling strengths. The resultant DR components, the CN components and their sum are shown for three energies in Fig. IV-15. At E_n = 1.8 MeV the data favor the symmetry of case A. However, at E_n = 2.5 MeV case B has become the better choice. At E_n = 3.0 MeV case A gives a very poor fit (it has not been shown), whereas case B proves to be quite satisfactory. Even so, the forward peaking of the data is not entirely reproduced, the rather larger error of the first data point not withstanding. The fact that case B gives an energy-independent coupling strength also weighs strongly in its favor. One further bit of support for case B results from the addition of DR components for the 0^+ and 3^+ states convoluted in the 858 keV group. Doing so produces a slight bump near ~90° which the data seem to exhibit in Fig. IV-13 and which the CN component alone does not possess.

The conclusion to be drawn from the foregoing discussion is that the more complex (but hopefully physically more realistic) coupling scheme, case B, is evidently more successful in reproducing the overall trends indicated by the data. Not only do these calculations conform to the shapes of the angular distributions but they also give a reasonably coherent account of cross section magnitudes. It is interesting to note that the amplitude of the DR component declines with increasing energy. It has been repeatedly stressed that the consequences of this revised coupling scheme must be considered in the context of the entire data base in order to be rigorous. Conversely (and this may well be the most important conclusion of this portion of the study), the physical significance of model-parameterization refinements are dependent upon the delineation of physically realistic coupling schemes.

Table IV-1. Base Tungsten Potential Parameters taken from Ref. IV-7.

Real Potential	
$V = 49.90 - 16\ (\frac{N-Z}{A}) - 0.25\ E$	MeV
$R = 1.26$	F
$A = 0.63$	F
Imaginary Potential	
$W = 4.93 - 8\ (\frac{N-Z}{A}) + 1.3\ E^{1/2}$	MeV
$R = 1.28$	F
$A = 0.47$	F

Where

All radii are equal to $R \cdot A^{1/3}$.

The real potential has the Saxon form.

The Imaginary potential is the surface-derivative of the Saxon form.

The spin-orbit strength is taken to be 6.0 MeV.

Quadrupole deformations are 0.223 (182), 0.209 (184) and 0.203 (186).

Hexadecapole deformations are -0.054 (182), -0.056 (184) and -0.057 (186).

Table IV-2. Level Structure used in Comparing Observed Neutron Inelastic Excitations with Calculations.

E_x[a](J-π)	E_x[a](J-π)	E_x[a](J-π)
^{182}W	^{184}W	^{186}W
671 (6+)	737 (6+)	742 (2+)
1138 (0+)	905 (2+)	858 (6+, 3+, 0+)
1229 + 1281 (2+, 2-, 2+)	1000 (0+, 3+)	950 (2-)
1309 + 1357 (3+, 3-)	1125 (2+, 2-, 4+)	1028 (2+, 4+, 4-, 3-)
1428 (4+)	1237 (3-, 5-, 5+, 0+)	1182 (0+)
1492+ (4-, 4+, 4-)		1296 (1-, 2+, 2+, 2+)

[a]Excitation energies in keV, J^π assignments taken from Ref. IV-5.

References, Section IV.

IV-1. T. Tamura, Rev. Mod. Phys., 37, 679(1965).

IV-2. JUSTSO, a coupled-channels computational program, P. Moldauer, Private Communication, (1980).

IV-3. W. Hauser and H. Feshbach,, Phys. Rev., 87, 366(1952).

IV-4. P. A. Moldauer, Nucl. Phys., A344 185(1980); see also Phys. Rev., C12 744(1975).

IV-5. Table of Isotopes, 7th Ed., Eds. C. Lederer and V. Shirley, John Wiley and Sons, New York (1978).

IV-6. A. Gilbert and A. Cameron, Can. Jour. Phys., 43, 1446(1965).

IV-7. J. P. Delaroche, G. Haouat, J. Lachkar, Y. Patin, J. Sigaud and J. Chardine, Proc. Conf. Nucl. Cross Sections for Technology, Natl. Bureau of Stds. Pub., NBS-SP-594 (1980).

IV-8. P. T. Guenther, "The elastic and inelastic scattering of fast neutrons from the even isotopes of tungsten," Thesis, University of Illinois (1977).

IV-9. D. Lister, A. Smith and C. Dunford, Phys. Rev., 162 1077(1967).

IV-10. P. Moldauer, Neutron Strength Functions, The Link between Resolved Resonances and the Optical Model, Conf. on Methods of Evaluation, Brookhaven National Laboratory, (1980).

IV-11. P. Guenther, W. Poenitz and A. Smith, Conf. on Methods of Evaluation, Brookhaven National Laboratory (1980).

IV-12. D. Coope, S. Tripathi, M. Schell, J. Weil and M. McEllistrem, Phys. Rev., C16 2223(1977).

IV-13. A. Smith, Private Communication (1980).

IV-14. P. Möller, Nucl. Phys., A192 529(1972).

IV-15. T. Tamura, ORNL Report No. 4152 (1967), Appendix A.

IV-16. B. Barrett, Private Communication (1981).

Figure Captions, Section IV.

Fig. IV-1. Comparison of measured and calculated neutron cross sections of ^{182}W, ^{184}W and ^{186}W. The measured values are indicated by data symbols as follows: + = total cross sections, 0 = elastic scattering, □ = inelastic excitation of the first 2+ state and X = inelastic excitation of the first 4+ state. The light "B" curve is an eye-guide constructed through the experimental results of of Ref. IV-9 as described in the text. Heavy curves denote the results of calculations; "A" (or unmarked) are results obtained with the "base" model described in the text and "C" are results obtained with modified compound-nucleus corrections as defined in the text.

Fig. IV-2. Comparison of measured and calculated neutron differential-elastic-scattering cross sectons of ^{182}W, ^{184}W and ^{186}W. Experimental results are indicated by data points and the results of calculations using the "base" model of the text by curves.

Fig. IV-3. Comparison of measured and calculated neutron-differential-scattering cross sections for the excitation of the first 2+ states of ^{182}W, ^{184}W and ^{186}W. The experimental results are indicated by data symbols and those obtained via calculation by curves.

Fig. IV-4. Comparison of measured and calculated neutron-differential-scattering cross sections for the excitation of the first 4+ states of ^{182}W, ^{184}W and ^{186}W. The experimental results are indicated by data symbols and those obtained via calculation by curves.

Fig. IV-5. Illustrative comparisons of measured and calculated differential-scattering cross sections of ^{182}W. Curves indicate the results of calculation; data points the experimental values defined as follows: □ = elastic scattering, 0 = inelastic excitation of the first 2+ level, and X = inelastic excitation of the first 4+ level. The incident neutron energies in MeV are numerical given in each section of the figure. The dimensionality is cross section in b/sr and scattering angle in lab.-deg.

Fig. IV-6. Illustrative comparisons of measured and calculated differential-scattering cross sections of ^{184}W. The notation is identical to that of Fig. IV-5.

Fig. IV-7. Illustrative comparisons of measured and calculated differential-scattering cross sections of ^{186}W. The notation is identical to that of Fig. IV-5.

Fig. IV-8. Comparison of measured and calculated neutron inelastic excitation cross sections of ^{182}W. The data points represent the measured values corresponding to the observed excitation energies noted in keV on the various sections of the figure. The curves indicate the results of calculations as described in the text.

Figure Captions, Section IV. (Contd.)

Fig. IV-9. Comparison of measured and calculated neutron inelastic excitation cross sections of ^{184}W. The data points represent measured values corresponding to the observed excitation energies noted in keV on the various sections of the figure. Curves indicate the results of calculations as described in the text.

Fig. IV-10. Comparison of measured and calculated neutron inelastic excitation cross sections of ^{186}W. The data points represent measured values corresponding to the observed excitation energies noted in keV on the various sections of the figure. Curves indicate the results of calculations as described in the text.

Fig. IV-11. Comparison of measured and calculated (with $\beta_2 = 0.205$) neutron cross sections of ^{182}W. Measured values are indicated by symbols as follows: + = neutron total cross sections, 0 = neutron elastic scattering cross sections, □ = cross sections for the excitation of the first 2+ state, and X = cross sections for the excitations of the first 4+ state. Curves "A" (and unmarked) denote the calculated results. Curve "C" indicates the calculated result obtained with the alternate formulation of the resonance fluctuation and correlation corrections as described in the text. Curve "B" indicates the low-energy experimental neutron total cross sections results derived from Ref. IV-9.

Fig. IV-12. Measured and calculated differential-neutron-elastic-scattering cross sections of ^{182}W at an incident neutron energy of 3.5 MeV. The measured values are indicated by circular symbols. The simple curve is the result of calculations using $\beta_2 = 0.223$ and the curve with "tick" marks results was obtained with $\beta_2 = 0.205$. Dimensionality is b/sr and θ in lab.-deg.

Fig. IV-13. The Angular Distributions of 2.5 MeV Neutrons Inelastically Scattered from ^{186}W. The distributions are identified by their mean experimental excitation energies. The label "C" refers to compound nuclear angular shapes as given by spherical compound-nucleus calculations. The label "C + D" refers to the superposition of compound nuclear and direct reaction components as described in the text. (Units: b/sr, lab.-deg.).

Fig. IV-14. The Coupled-Channels-Calculated Direct Reaction Angular Distributions of 2.5 MeV Neutrons Scattered from ^{186}W. The label "0" refers to the coupling scheme involving only the first three members of the ground state rotational band. The label "A" refers to the coupling scheme of "0" plus the first two members of the gamma-vibrational band. The label "B" refers to the coupling scheme of "A" plus the β-vibrational band head. Part (a) shows angular distributions for the first two members (0^+, 2^+) of the ground state rotational band, while part (b) indicates those for the first two members (2^+, 3^+) of the gamma-vibrational band and the beta-vibrational band head (0^+). See text for details. (Units: b/sr, lab.-deg.).

Figure Captions, Section IV. (Contd.)

Fig. IV-15. The Angular Distributions of 1.8, 2.5 and 3.0 MeV Neutrons Scattered from the Gamma-Vibrational Band Head in ^{186}W. The label "C" refers to the angular-distribution shape given by spherical compound-nucleus calculations. The labels "A" and "B" refer to the direct-reaction angular distribution shapes calculated by the coupled-channels method using coupling schemes A and B as defined in Fig. IV-14. The labels "C + A" and "C + B" identify the sums of compound nuclear and direct-reaction components as described in the text. (Units: b/sr, lab.-deg.).

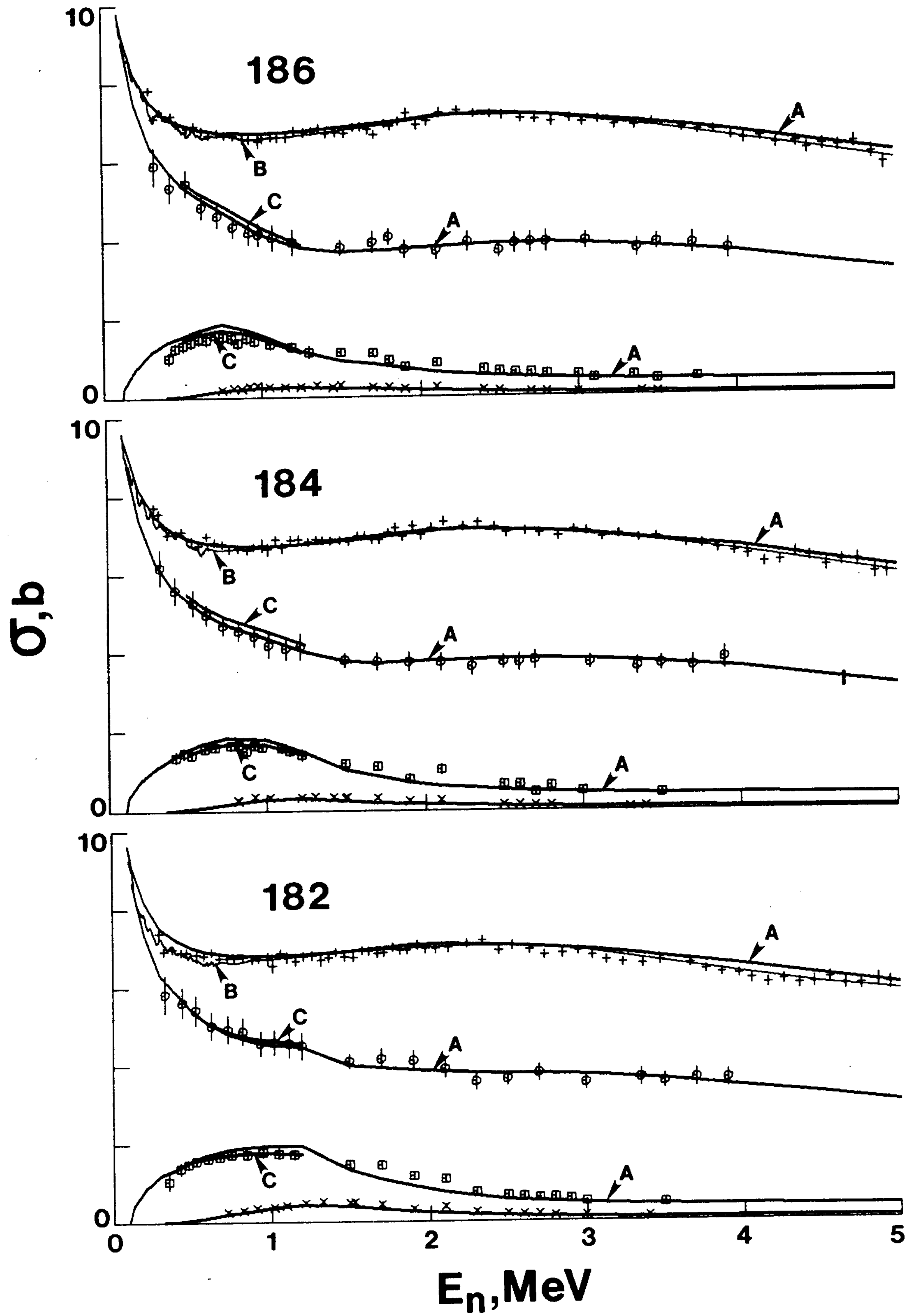


Fig. IV-1.

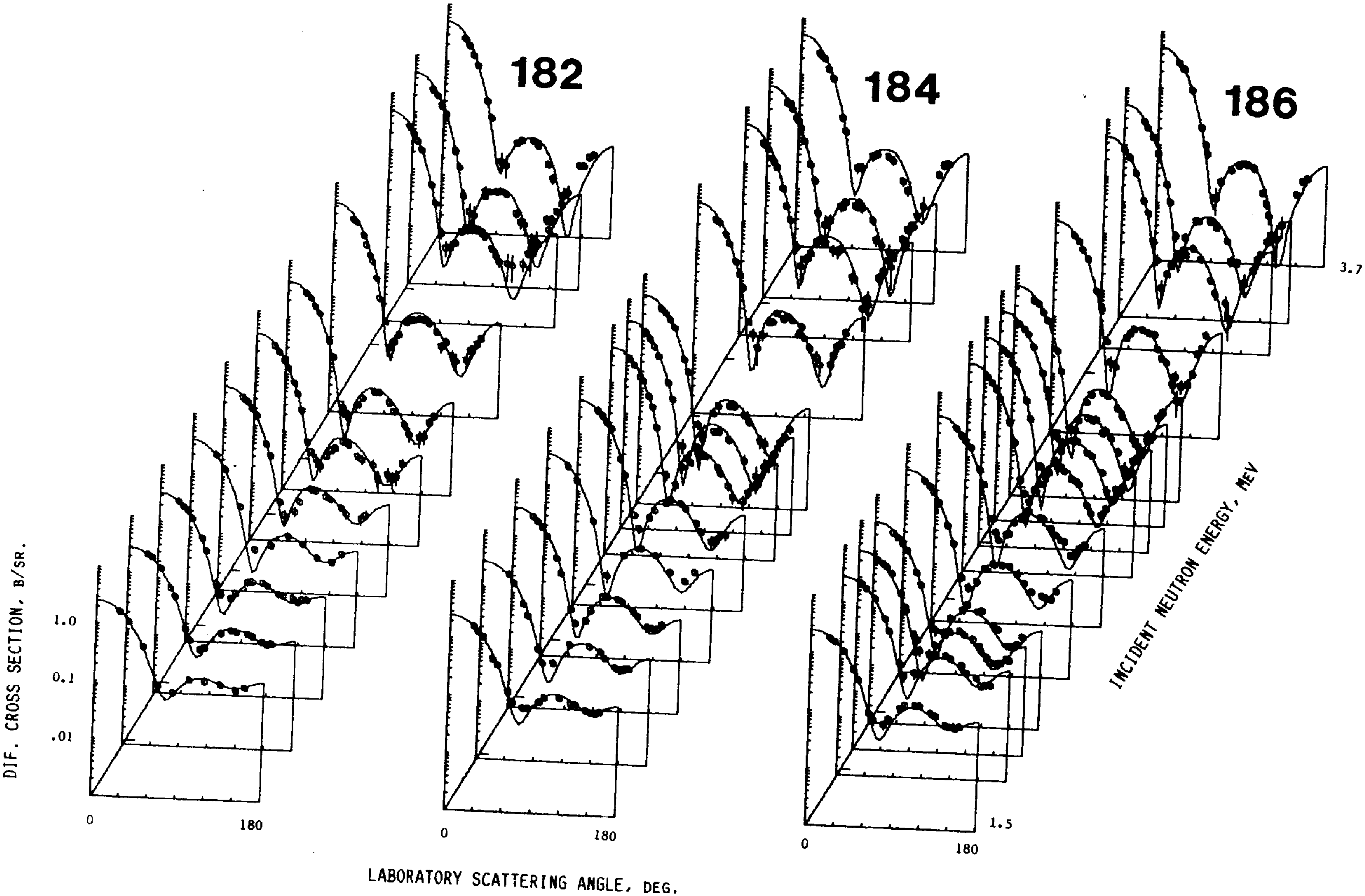
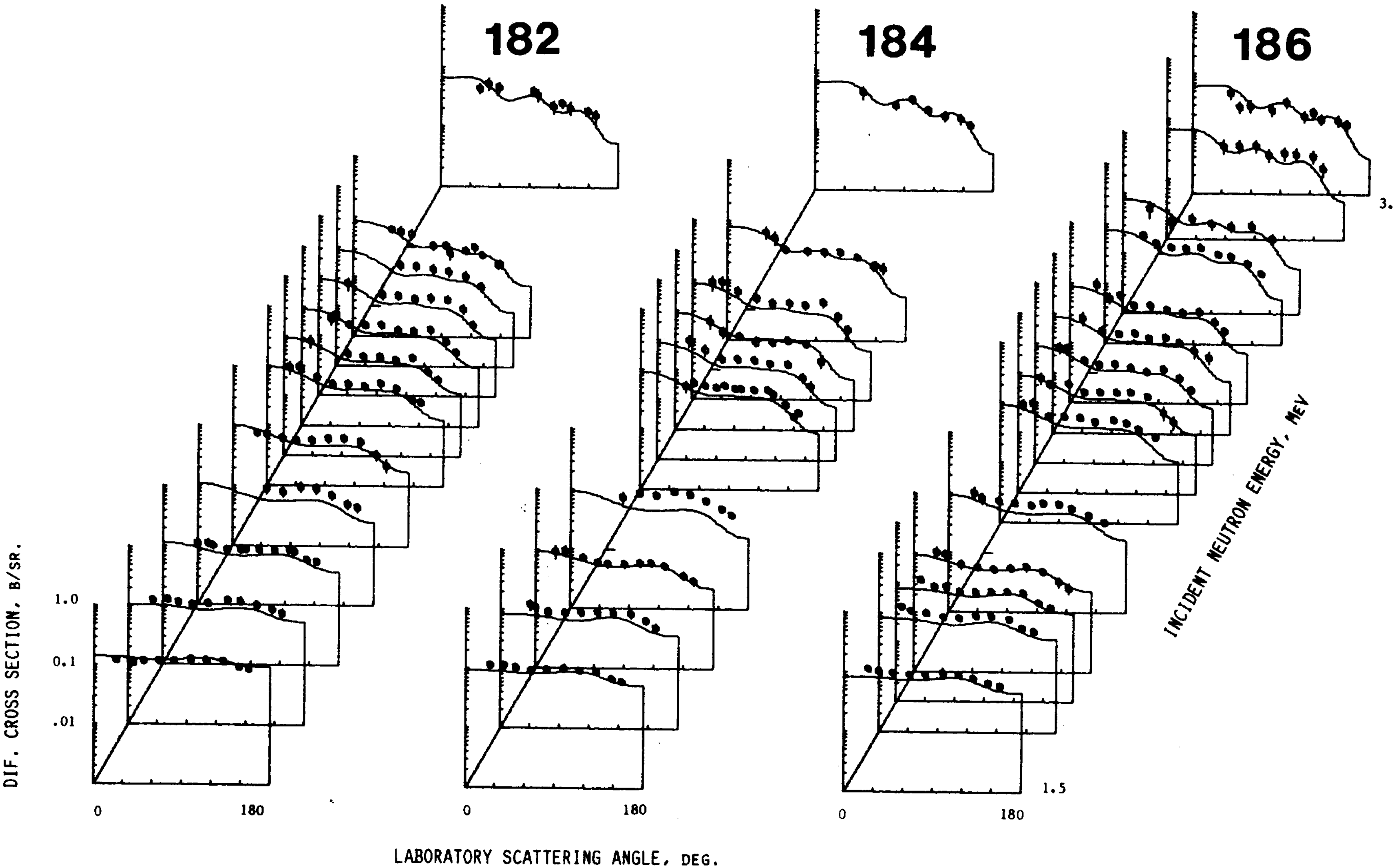

182
184
186
DIF. CROSS SECTION, B/SR.
1.0
0.1
.01
0
180
0
180
0
180
1.5
3.7
INCIDENT NEUTRON ENERGY, MEV
LABORATORY SCATTERING ANGLE, DEG.

Fig. IV-2.


182
184
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DIF. CROSS SECTION, B/SR.
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0.1
.01
0
180
0
180
0
180
1.5
3.5
INCIDENT NEUTRON ENERGY, MEV
LABORATORY SCATTERING ANGLE, DEG.

Fig. IV-3.

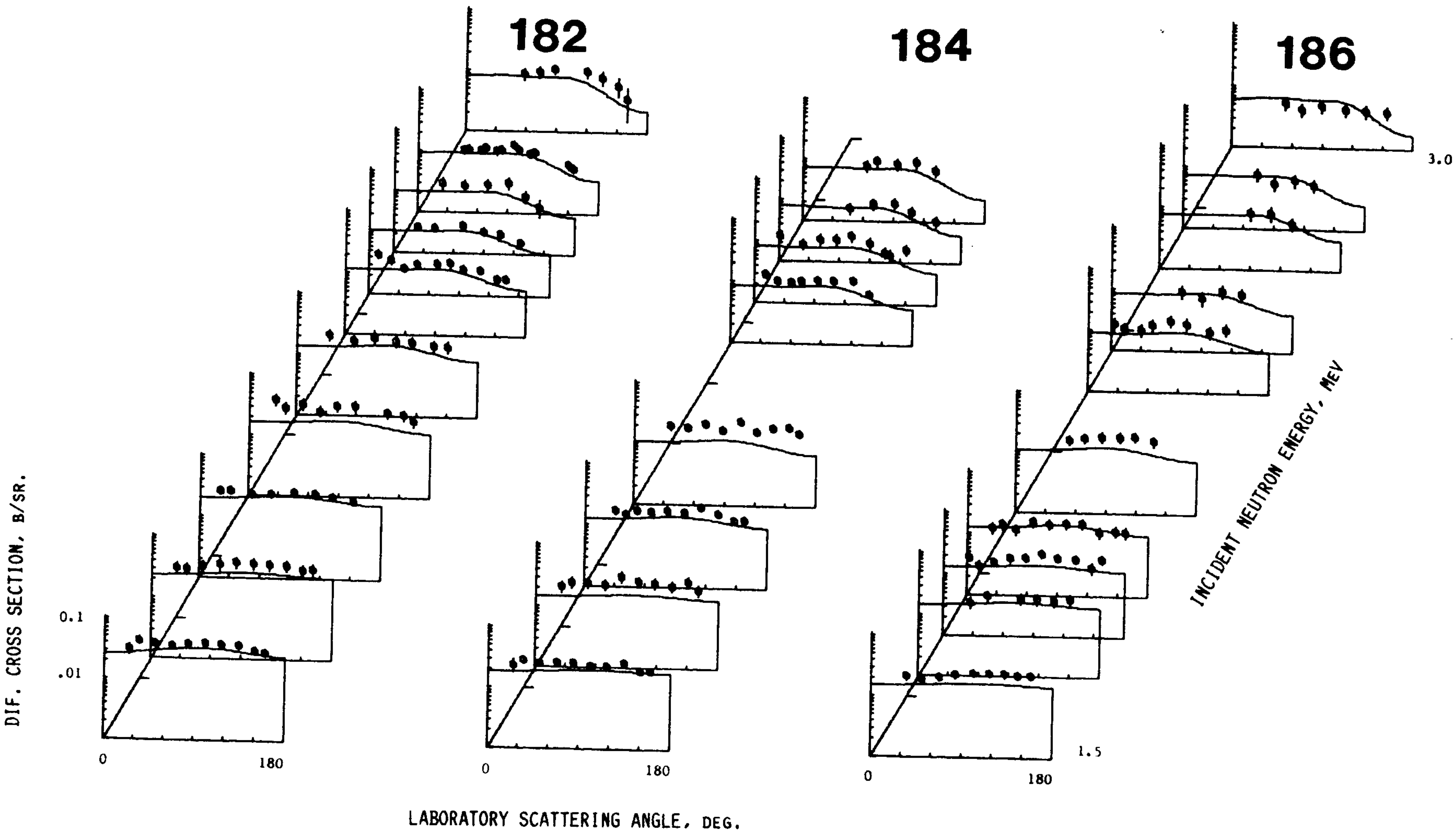

182
184
186
DIF. CROSS SECTION, B/SR.
0.1
.01
0
180
0
180
0
180
1.5
3.0
INCIDENT NEUTRON ENERGY, MEV
LABORATORY SCATTERING ANGLE, DEG.

Fig. IV-4.

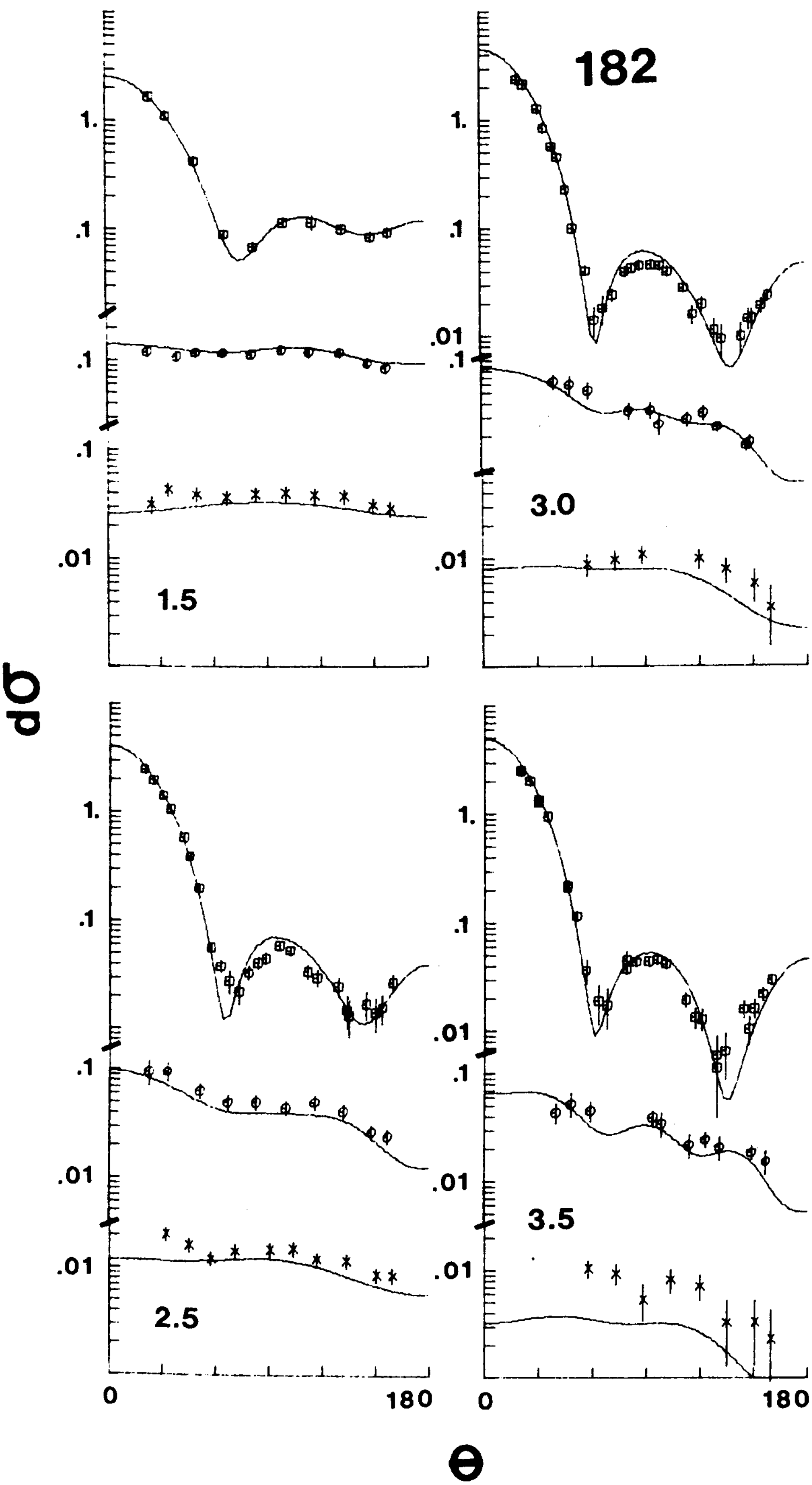


Fig. IV-5.

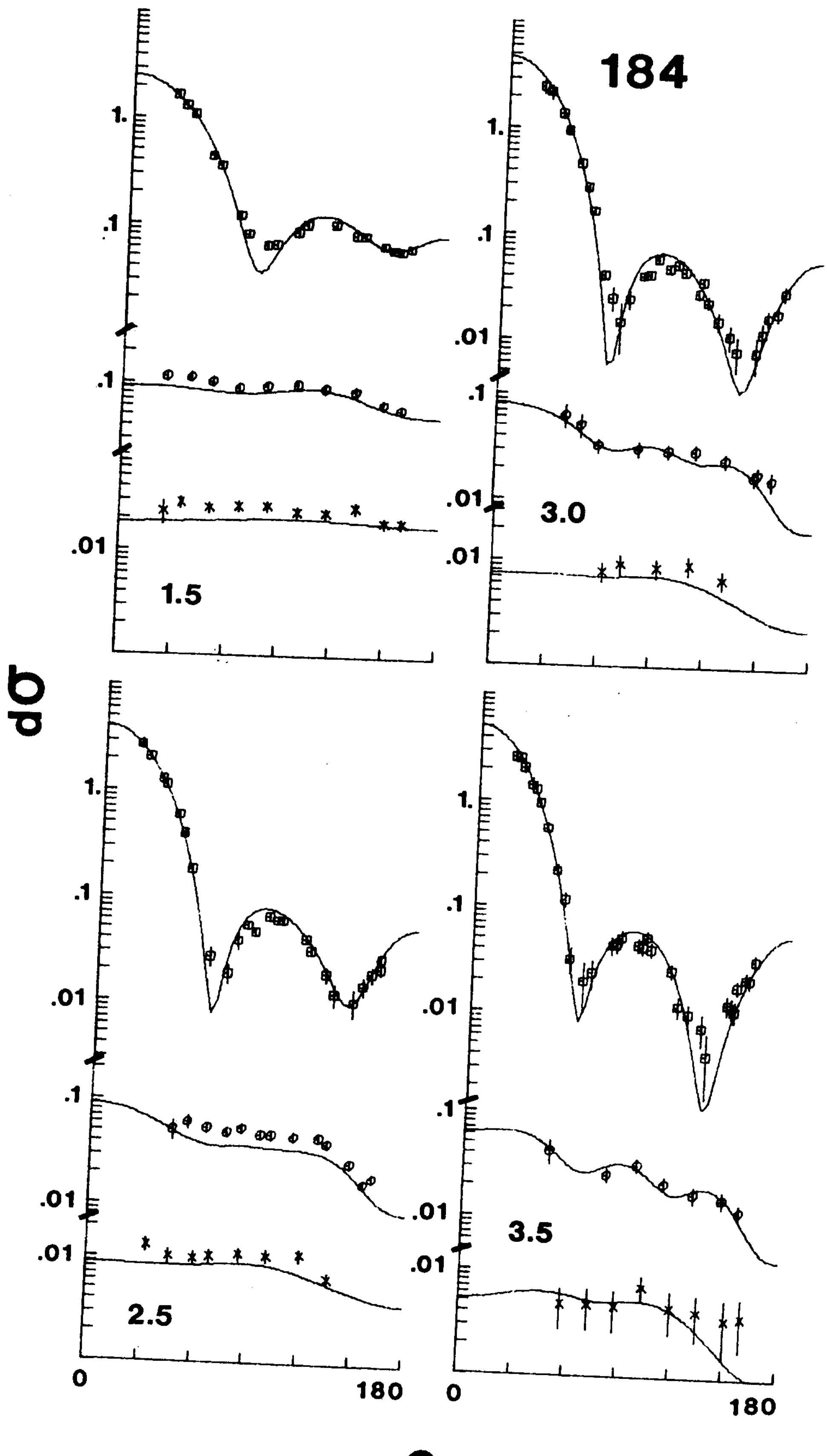
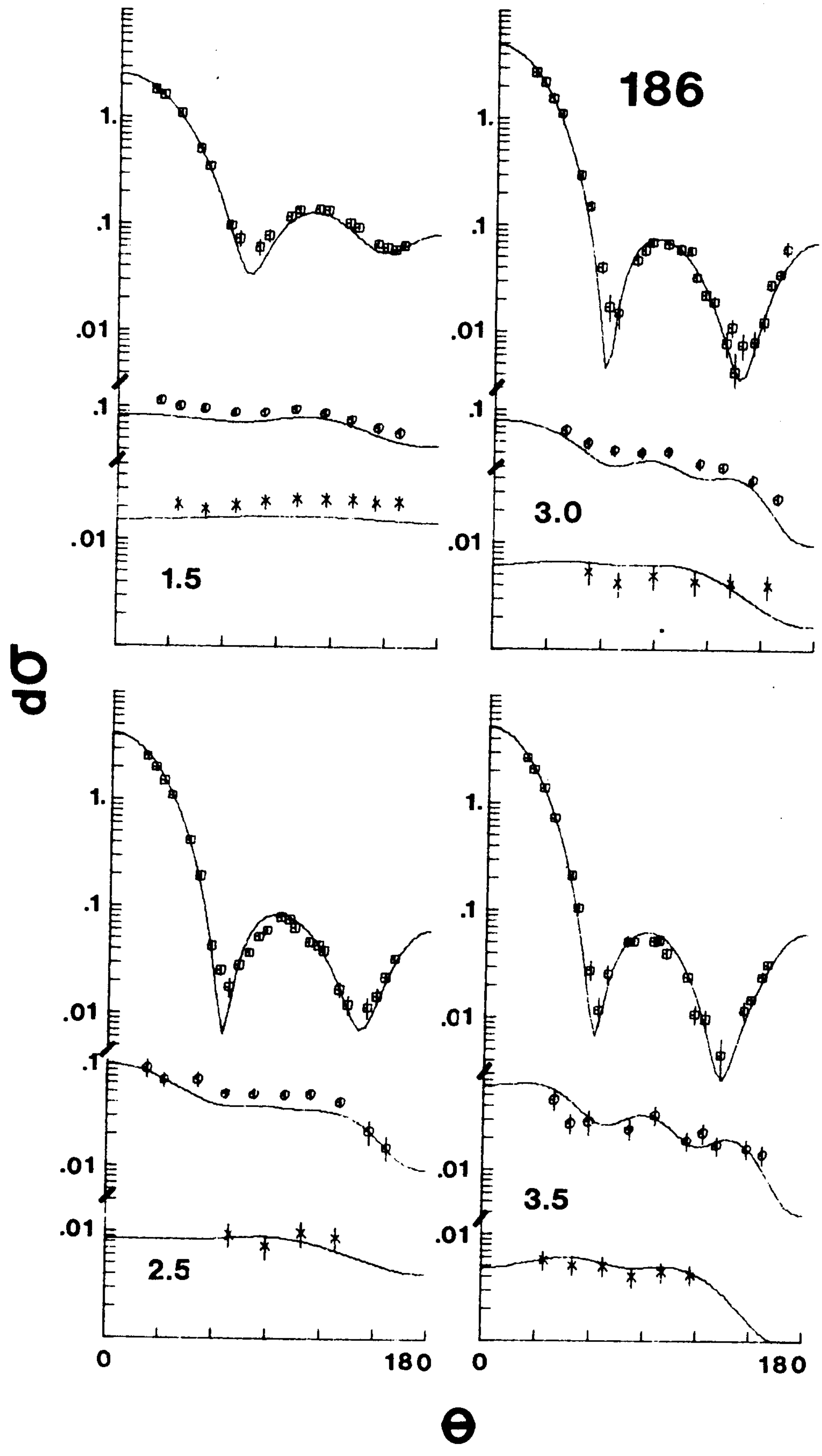

184
1.
.1
.1
.01
1.5
1.
.1
.01
.1
.01
3.0
.01
1.
.1
.01
.1
.01
.01
2.5
1.
.1
.01
.1
.01
3.5
.01
dσ
0
180
0
180
θ

Fig. IV-6.



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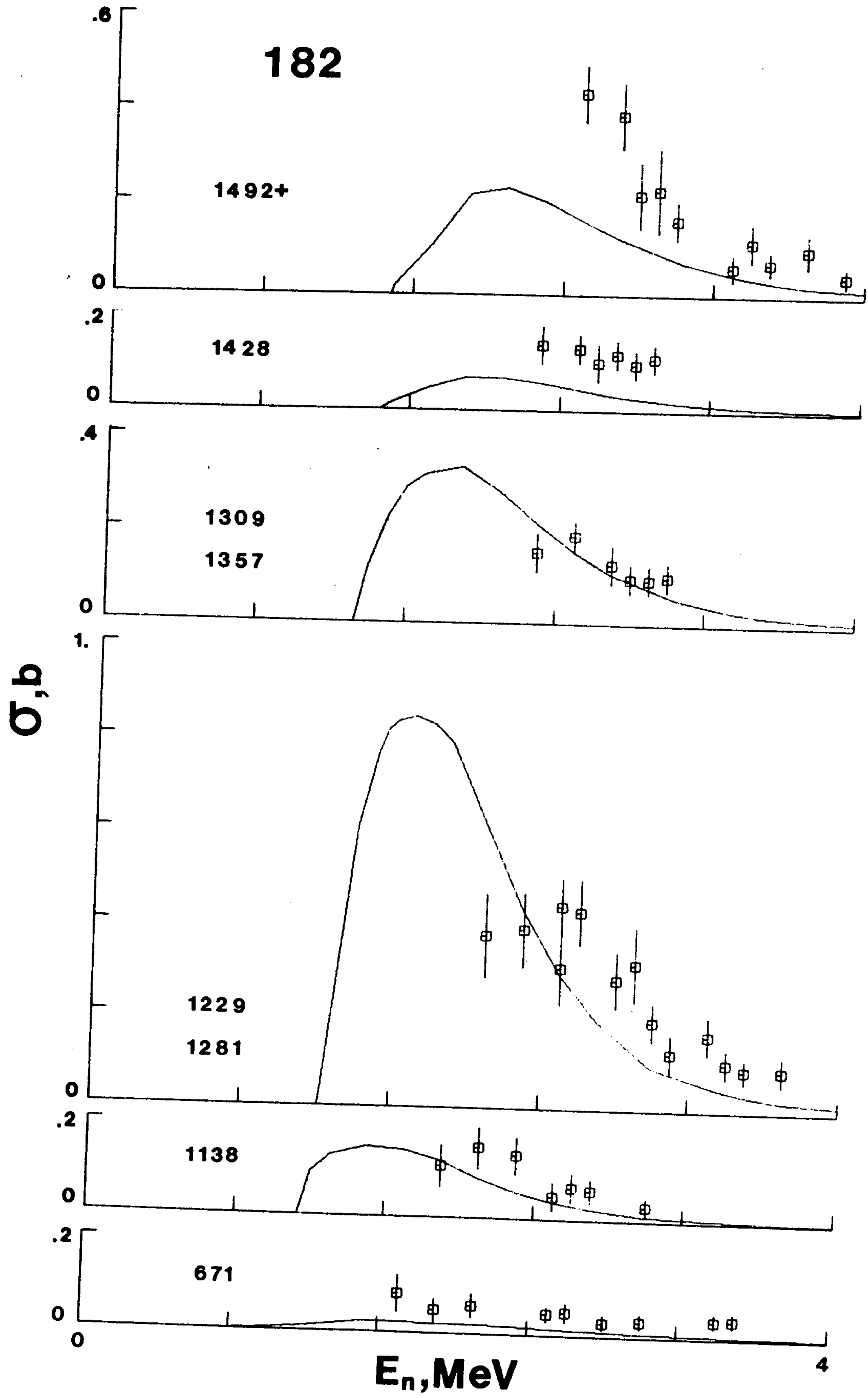
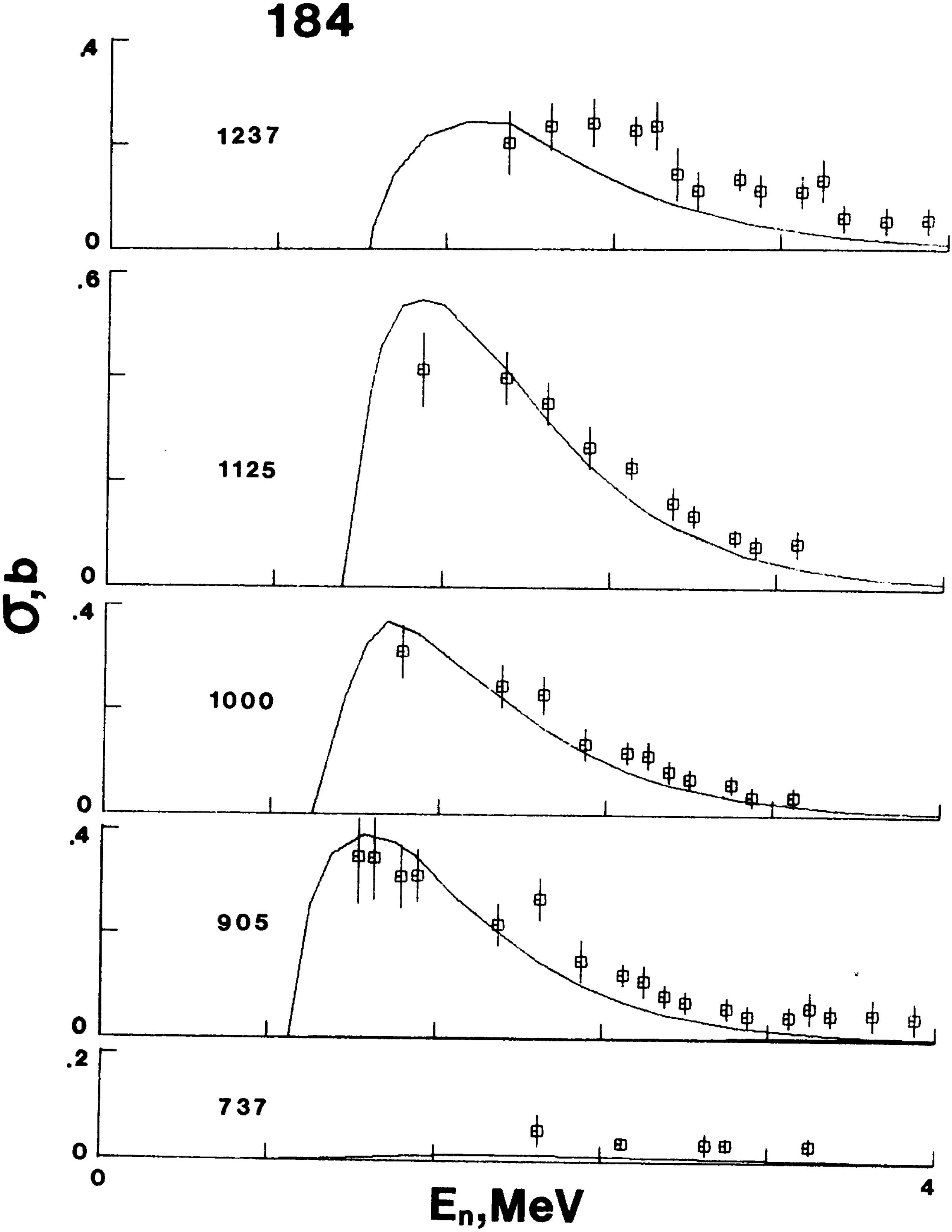


.6
182
1492+
0
.2
1428
0
.4
1309
1357
0
1.
σ,b
1229
1281
0
.2
1138
0
.2
671
0
0
4
En,MeV

Fig. IV-8.



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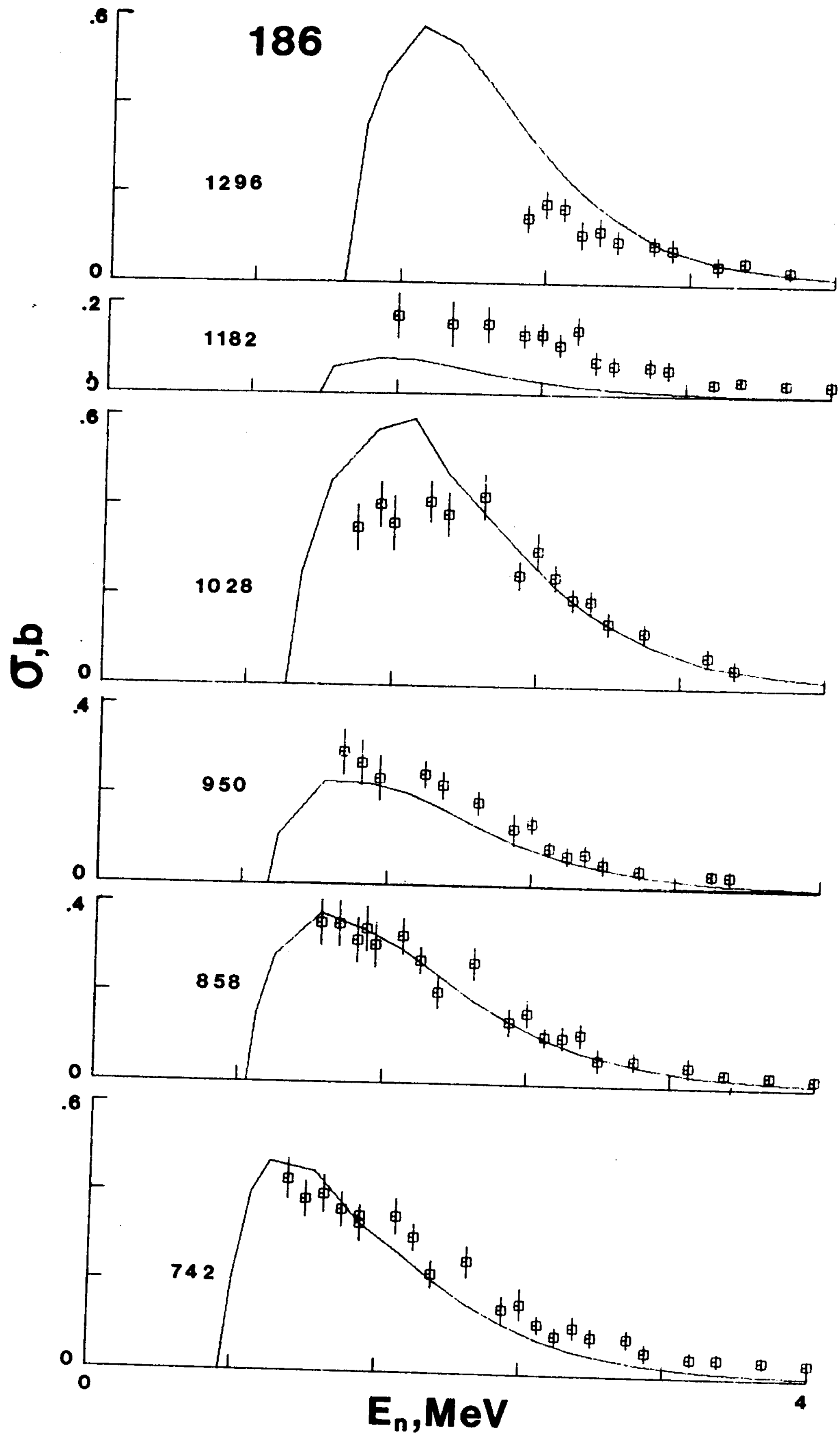

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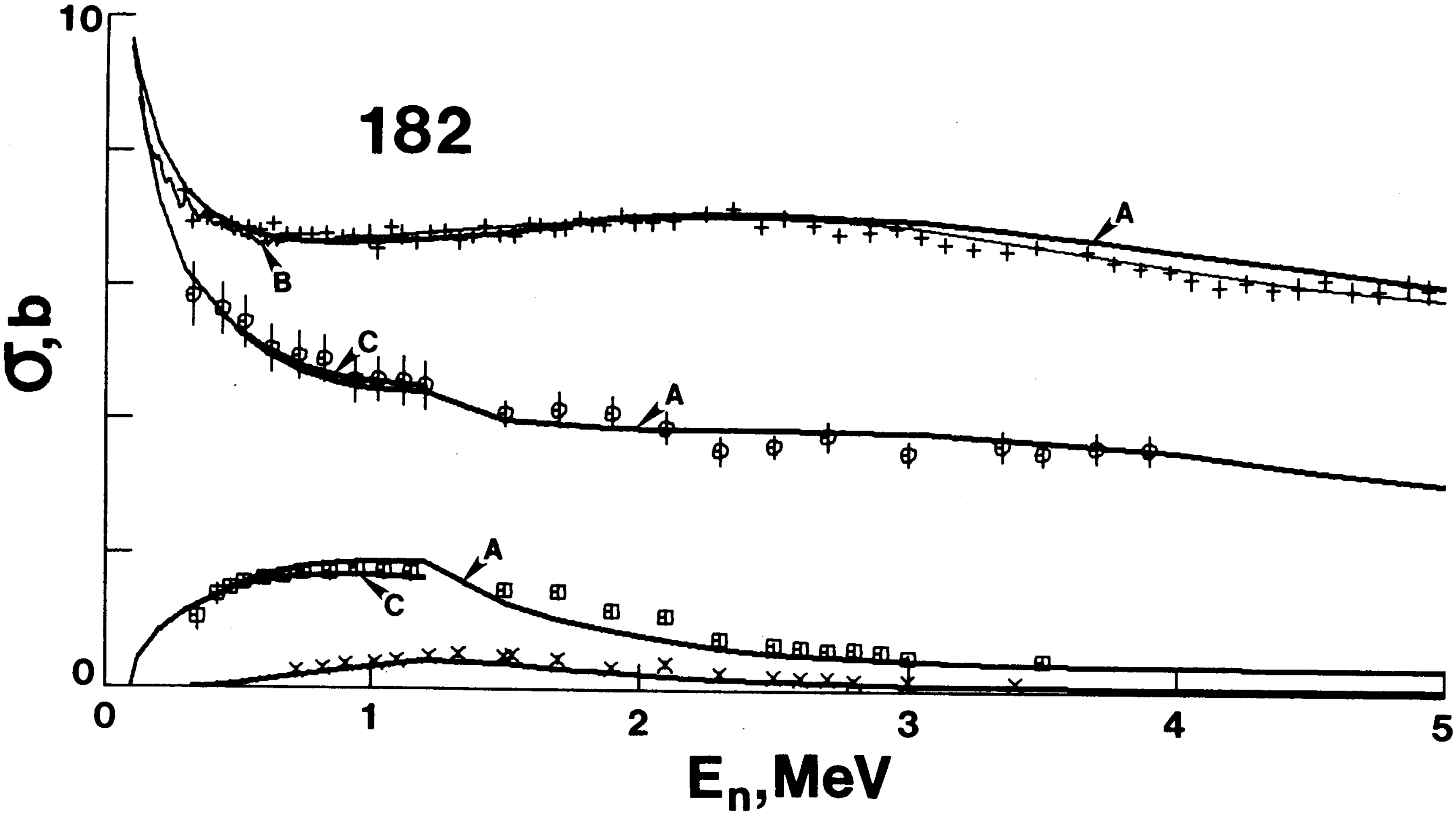

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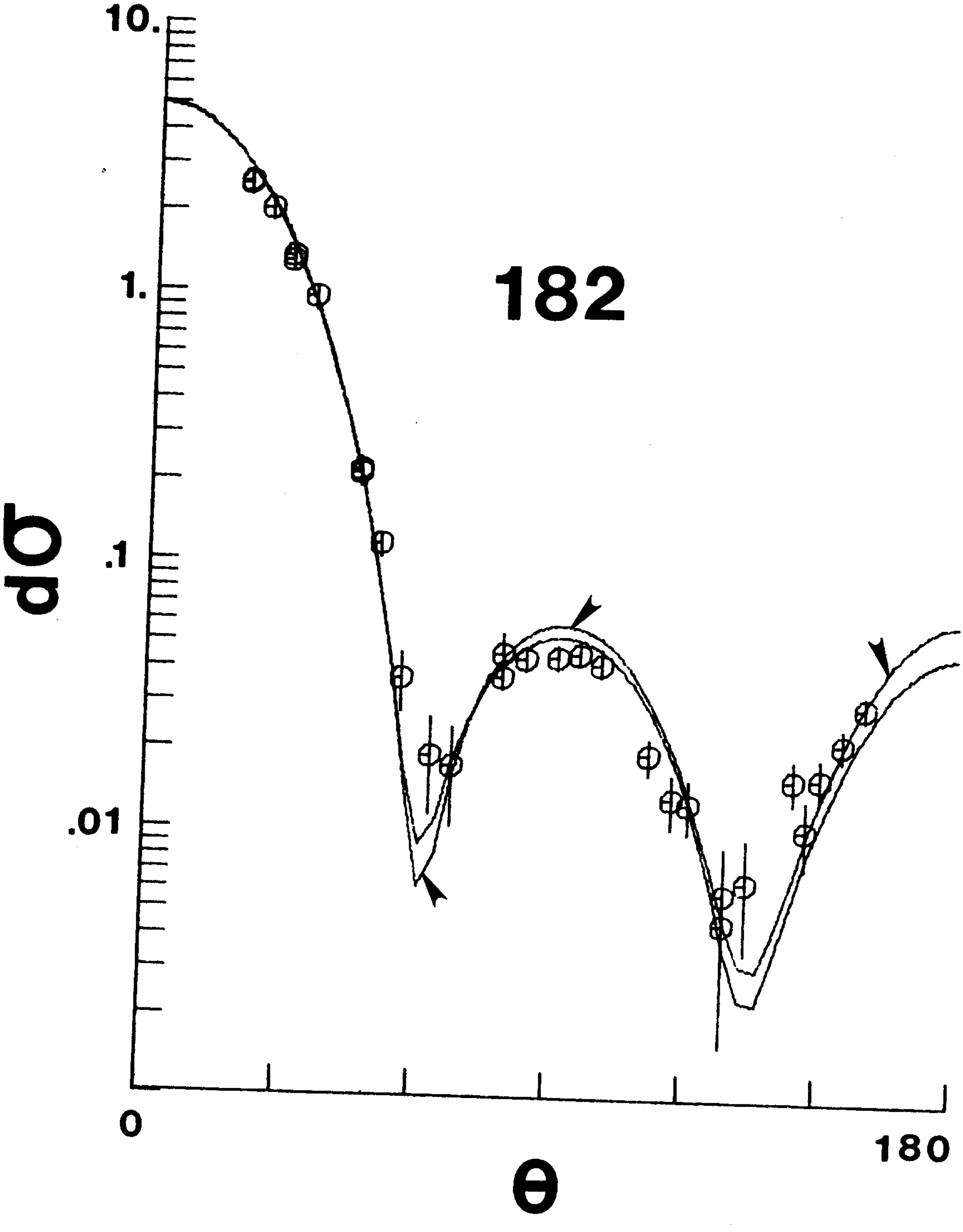
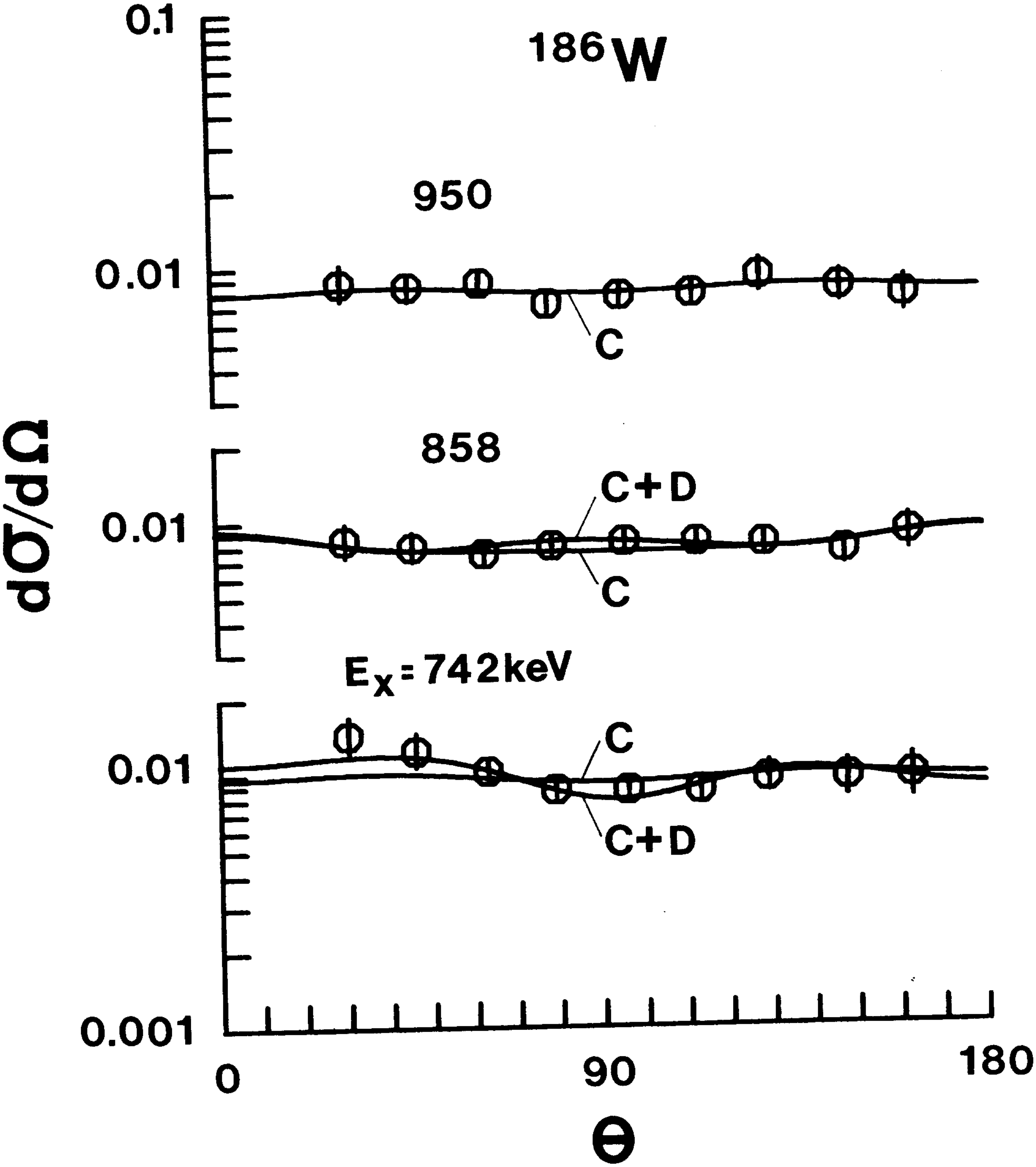
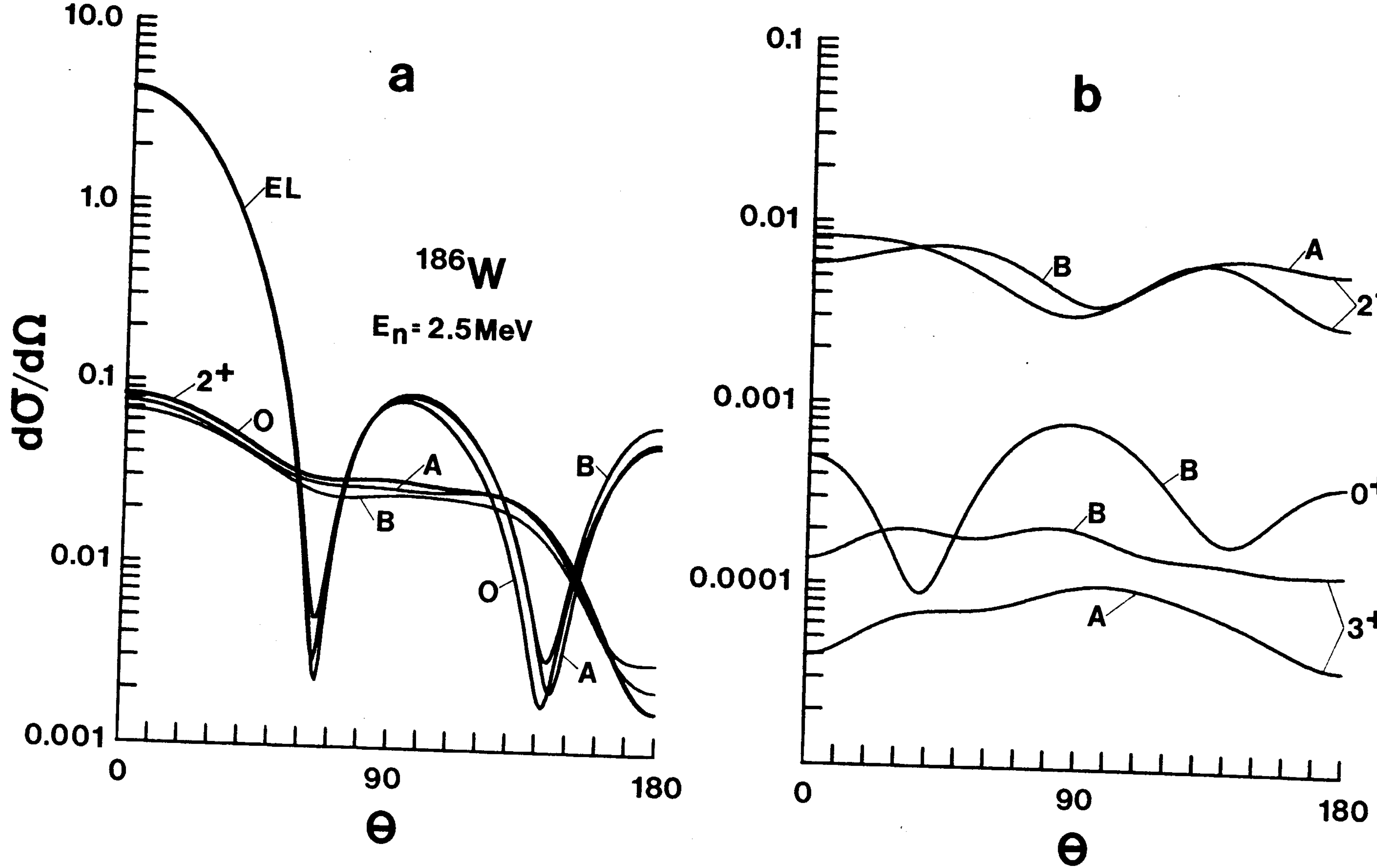


Fig. IV-12.



^{186}W
950
0.1
0.01
C
858
C+D
0.01
C
E_x=742keV
C
0.01
C+D
0.001
dσ/dΩ
0
90
180
θ

Fig. IV-13.



a
b
^{186}W
E_n= 2.5MeV
dσ/dΩ
10.0
1.0
0.1
0.01
0.001
0.0001
EL
2+
0
A
B
0+
3+
0
90
180
Θ

Fig. IV-14.

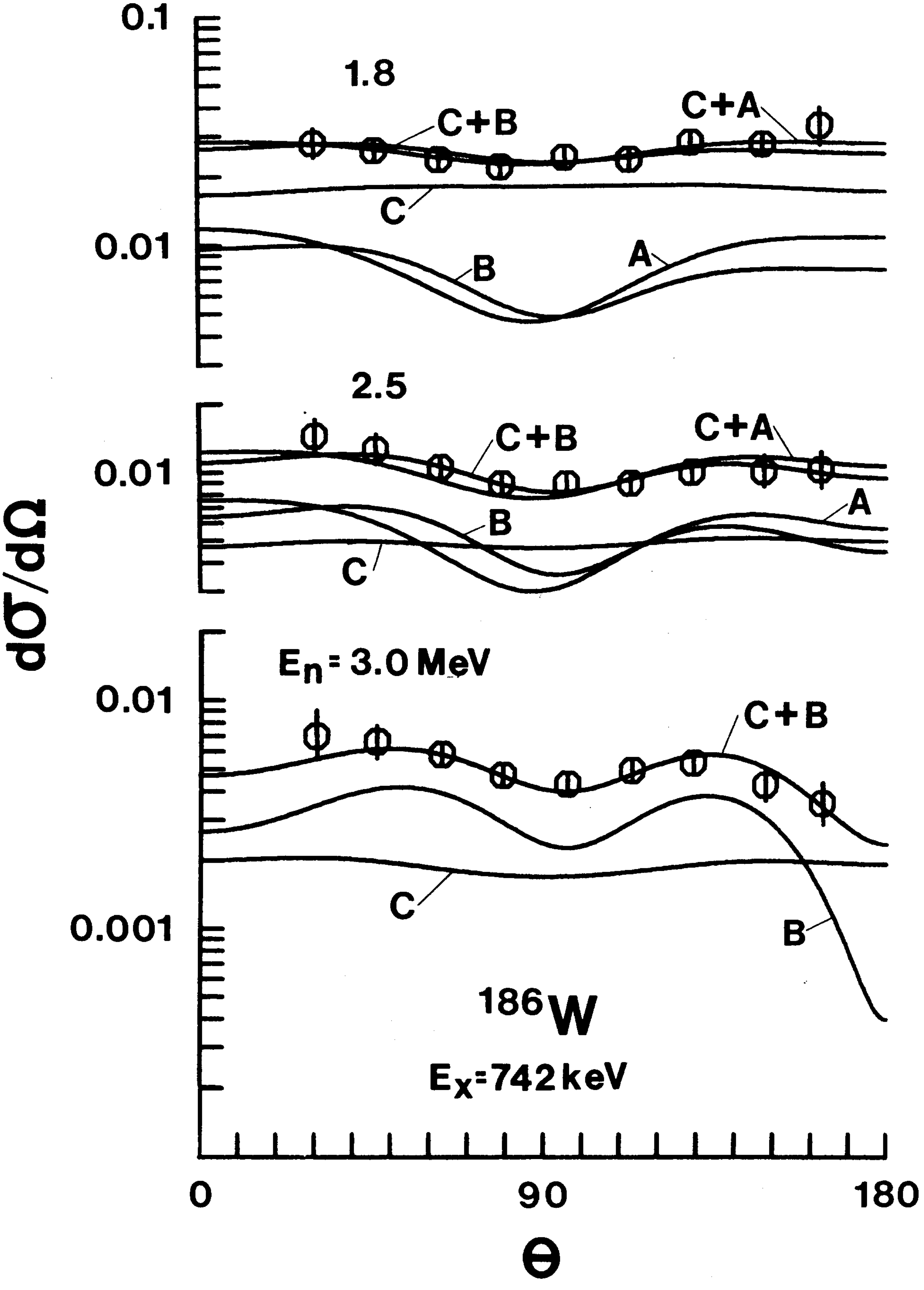

0.1
1.8
C+B
C+A
C
0.01
B
A
2.5
C+B
C+A
0.01
A
B
C
E_n= 3.0 MeV
0.01
C+B
C
0.001
B
^{186}W
E_x=742 keV
0
90
180
dσ/dΩ
Θ

Fig. IV-15.

V. EVALUATED NUCLEAR DATA FILE

This evaluation was primarily limited to neutron-interactions with the isotopes ^{182}W, ^{184}W and ^{186}W over the energy range of the present experiments and of those previously reported from this laboratory (V-1). The objective was the provision of a limited evaluation that can serve as an input to more comprehensive evaluation efforts to be reported elsewhere (V-2) and to provide a summary experimental data base for the comparisons of measured and calculated values as discussed in the previous section. The present measurements and those of Ref. V-1 provide a relatively comprehensive experimental basis for the evaluation excepting only radiative capture processes. For the latter, explicit reliance was placed upon the evaluation of Ref. V-3 and the experimental values cited therein. The numerical results of the present partial evaluations are given in Appendix A in the ENDF format (V-4).

A. Neutron Total Cross Sections

The experimental data base is limited to four sets of results none of which span the entire energy range considered here (0.1-15.0 MeV). There is no experimental information above 15 MeV. Lister et al. (V-1) have reported detailed measurements over the range 0.1-0.65 MeV as the result of the application of monoenergetic-source techniques. These results were corrected for resonance self-shielding perturbations, as described in Sec. III, and averaged over a 20 keV resolution function so as to smooth the evident structure while at the same time retaining the character of the intermediate fluctuations. The present work provides detailed experimental results over the range 0.2-5.0 MeV. Martin et al. (V-5) have reported values over the range 0.7-15.0 MeV obtained using white-source techniques. Foster and Glasgow (V-6) have used similar methods to obtain detailed results over the range 2.3-15.0 MeV. The latter two white-source measurements were made over energy regions where the cross sections are expected to be energy-smooth therefore the data of each set was averaged over a 100 keV resolution function in order to remove fluctuations of an experimental origin. The four sets of data are not entirely consistent and therefore evaluation judgments were made as per the following.

In the case of ^{182}W the results of Lister et al. provide the most detailed information in the low-energy region and they are supported by the results of the present work. The two sets of data are consistent to well within the respective experimental uncertainties considering the structure evident in the better-resolution work of Ref. V-1. Thus the evaluation relies primarily upon the results of Lister et al. to energies of 0.65 MeV. From 0.7 to 2.3 MeV two sets of experimental data are available; the results of Martin et al. and those from the present work. The two sets of results are similar in this energy range but the values of Ref. V-5 show systematic problems in the context of the other two isotopes that are a concern; therefore the evaluation relied upon the present work over the range 0.65-2.3 MeV. From 2.3 to 5.0 MeV the present results and those of Foster and Glasgow are essentially identical and both sets of values are somewhat larger than those reported by Martin et al. The evaluation in the 2.3-5.0 MeV range is constructed through an average of the results of the present work and those reported by Foster and Glasgow. Above 5.0 MeV there are only two sets of experimental data available; those reported by Foster and Glasgow and by Martin et al. They are reasonably consistent but the latter is subject to much larger statistical uncertainties and thus the evaluation over the range 5.0-15.0 MeV relied upon the Foster and Glasgow results. The various aspects of the experimental data bases and a comparison of the measured and evaluated neutron total cross sections are illustrated in Figs. V-1 and -2.

The evaluation of the neutron total cross sections of ^{184}W followed essentially the same rationale as outlined above for the ^{182}W case. However, in this case the values of Martin et al. are very clearly discrepant with those obtained in the present work at low energies and inconsistent with an energy extrapolation of the results of Lister et al. Moreover, the results of Ref. V-5 are not consistent with the model interpretations discussed in Sec. IV, above. Therefore, the ^{184}W results of Martin et al. were entirely abandoned. The data base and the evaluation are compared in Figs. V-1 and -2.

The evaluation procedure used for the neutron total cross sections of ^{186}W was identical to that employed in the ^{184}W case. Again, the values of Martin et al. appear seriously discrepant at lower energies and thus were abandoned. The evaluation and data base are compared in Figs. V-1 and -2.

With the limited experimental information available for the evaluation of the neutron total cross sections uncertainty estimates must be subjective. Guidelines setting forth such uncertainty estimates are given in Table V-1.

The present evaluations can be tested by constructing an "elemental" cross section from the appropriate isotopically-weighted average of the ^{182}W, ^{184}W and ^{186}W evaluations and comparing the result with the reported elemental neutron total cross sections of tungsten (V-7). The constructed "elemental" cross section represents $\approx$85% of the naturally occurring isotopes and it is unlikely that the total cross sections of the remaining $\approx$15% of the isotopes greatly differ from those of the three even isotopes studied here. The constructed "elemental" cross sections and the true measured values are consistent to within the respective experimental uncertainties.

B. Elastic-neutron-scattering Cross Sections

The available experimental-neutron-elastic-scattering information was assembled into three isotopic data bases. Measured data was accepted only when relevant to the particular isotope and when the measurements reasonably resolved the elastic component from all inelastic contributions. With these criteria the available information was limited to energies of $\lesssim$4.0 MeV. Below energies of ~1.5 MeV the only experimental information appears to be from the work of Lister et al. (V-1). These results are detailed and were obtained with good resolution over the energy range $\lesssim$0.3-1.2 MeV. Approximately 200 keV averages of this data set were used in the evaluation. Above $\approx$1.2 MeV the experimental coverage was limited and the experimental resolutions less satisfactory, thus the results of Ref. V-1 were used only to 1.2 MeV. From 1.5 to 4.0 MeV there is a large body of experimental information as the result of the present work which covers the energy-angle range in considerable detail. A third set of data was available at 3.4 MeV as reported by Delaroche et al. (V-8 and -9). The three sets of data are reasonably consistent as illustrated by the comparisons of Sec. III, above. The composite experimental data base for each isotope was least-square fitted with Legendre-polynomial series. The resulting polynomial coefficients were then fitted with smoothly-varying energy dependent curves and the evaluated quantities taken from the respective curves. In doing so most attention was given to low-order coefficients which are of most applied importance. The high-order coefficients were less well defined by the experiments but the consequent uncertainties primarily effected the details of the distributions (e.g. the exact character of the diffraction minimia) which generally are not of applied significance. Uncertainty guidelines for the low-order (e.g. $\lesssim 6$) terms are 5-10% and somewhat larger for the high-order terms, as estimated from the consistency of results obtained from the various experiments.

Inherent in the above evaluation process is the derivation of the angle-integrated elastic-scattering cross sections. These were believed known to 5-8%, again, judging from the consistency of measured and evaluated results. The angle-integrated elastic-scattering results were used for the deduction of the non-elastic cross sections. At energies $\gtrsim 3.0$ MeV the partial cross sections were not completely resolved in any of the experiments and consequently there remains a continuum inelastic component that was dictated by the above non-elastic cross sections. Below ≈ 3.0 MeV the deduced non-elastic cross sections served as a verification check of the observed partial cross sections. In detail, the evaluated elastic-scattering cross sections were derived as the difference between the neutron total cross sections and the sum of the non-elastic partial cross sections in order to assure the mandatory internal file consistency. In doing so care was taken to assure that the elastic cross sections so derived were consistent with those independently deduced from the elastic-scattering measurements. In all cases Wick's Limit was adhered to (V-10). The relative elastic scattering angular distributions were finally expressed as f_ℓ coefficients (V-4). The resulting evaluated differential-elastic-scattering cross sections are summarized in Fig. V-3. They are reasonably consistent with the model interpretations of Sec. IV, above. The deviation of the evaluated quantities from the calculated values is largest at the very extreme minimia of the distributions where the evaluated cross sections are not as small as those calculated from the model. Such differences are of little, if any, applied importance. There is some fluctuation with energy in the evaluated distributions reflecting similar behaviors of the underlying experimental data bases.

C. Neutron Inelastic-scattering Cross Sections

There are only three relevant inelastic-scattering experimental-data sets: 1) that of Ref. V-1 (~0.3-1.5 MeV), 2) that of the present work (1.5-4.0 MeV), and 3) results for the excitation of the ground-state rotational band at an incident energy of 3.4 MeV from Refs. V-8 and -9. These three sets of data are outlined and compared in Sec. III, above. The present evaluations assumed the level energies of Ref. V-11 to excitations of ~1.0 MeV. The energies of "levels" at excitations $\gtrsim 1.0$ MeV were taken from the present measurements as summarized in Tables III-1A, B and C. As evident in Fig. III-8, these "levels" are generally composites of contributions from a number of true levels far too closely spaced to be experimentally resolved and representing a level density far exceeding the capacity of the ENDF format. Truncation to the observed "levels" is generally not a limitation in most file applications. The evaluated neutron-inelastic-scattering cross sections were primarily deduced from the observed quantities supported by the results of the model calculations of Sec. IV, particularly near thresholds where experimental information is not available. Generally, the evaluations followed the "eyeguides" of Figs. III-12A, B and C and the calculated results of Figs. IV-8, 9 and 10.

The estimated uncertainties associated with the discrete-inelastic-excitation cross sections vary from 5-10% in the prominent and better-known cases (e.g. the excitation of the 2+ and 4+ levels of the ground-state rotational band) to considerably larger values for cross sections due to levels at much higher excitation energies. Many of the latter components are very speculative but the overall trend is reasonably known. As a consequence the total inelastic cross sections were believed known to ~10% to incident energies of 2.5-3.0 MeV. This conclusion was supported by the consistency of non-elastic cross sections as deduced from total and elastic-scattering cross sections and as obtained by summing non-elastic partial-cross-section components. Furthermore, a broad-group energy-transfer matrix derived from the discrete inelastic components will have reasonably accurate elements not particularly sensitive to contributions from a single observed "level". Thus the presentation has the merit of reasonably representing the observed inelastic excitation cross sections for most applications in a transitional region not well described by simple statistical perscriptions. The overall character of the discrete inelastic evaluations and their cumulative effect leading to the total inelastic-scattering cross sections are illustrated in Fig. V-4.

Neutrons resulting from the excitation of discrete levels were generally assumed to be isotropically distributed as indicated by observation (e.g. see Fig. III-13). An exception was the excitation of the first two levels of the ground-state rotational band (see Figs. III-9 and -10). In these two cases the evaluations included an anisotropy derived from observation and the model of Sec. IV. At low-energies the anisotropy associated with these two levels is small. At higher energies it can be large but there the energy transfer is relatively small and thus the exact character of the distributions is of minor applied importance.

Level-energies above ≈3.0 MeV levels were no longer observed and thus the sum of discrete-inelastic cross sections falls short of the total inelastic cross section and a continuum component is employed in the evaluations. In ^{184}W, comparisons of total, elastic and non-elastic cross sections suggests that the continuum starts very near 3.0 MeV. Its magnitude is set by the differences between the observed cross sections as outlined in Sec. V-B, above. Similar comparisons for ^{182}W suggested that the discrete-excitation cross sections for "levels" >2.5 MeV, as given by the eye-guides of Figs. III-12A, are too large by 10-15%. Such a discrepancy is well within the experimental uncertainty in this speculative region therefore the magnitudes of the ^{182}W eye-guides in this region were correspondingly reduced before incorporating them in the evaluation. An analogous problem was encountered in a similar energy region in the case of ^{186}W only here the non-elastic cross section suggests that the eye-guides of Fig. III-12C underestimates the discrete inelastic magnitudes by ~10% between ≈2.5-3.0 MeV. This discrepancy was resolved by introducing the ^{186}W continuum component at somewhat lower energies (i.e. ~2.5 rather than 3.0 MeV). The fact that these small discrepancies are somewhat different in character for ^{182}W and ^{186}W may reflect differences in the underlying level structure in the context of the experimental resolutions. The general nature of these continuum components and the agreement between measured and evaluated elastic-scattering cross sections is illustrated in Fig. V-4. The evaluations assume that the continuum neutron emission is isotropically distributed. The corresponding energy-spectrum distributions are not given in the evaluations. It is reasonable to accept in this energy region one of the conventional statistical distributions, e.g. that of Gilbert and Cameron (V-12).

D. An Illustrative Comparison with ENDF/B-V

Portions of the present evaluation were compared with relevant sections of ENDF/B-V (V-4). ^{186}W was arbitrarily selected for this purpose for the pragmatic reason that the corresponding ENDF/B-V isotopic file was readily available. Some of these comparisons are illustrated in Fig. V-5. There are large differences between the present evaluation and that of ENDF/B-V. Neutron total cross sections can differ by ±5-10% in magnitude. In some energy regions neutron elastic-scattering cross sections are discrepant by 15-20% and differences in the neutron total inelastic-scattering cross sections can be 10% or more. In addition, the present representation of neutron inelastic-scattering is very different from that of ENDF/B-V with the latter giving far more emphasis to the continuum-inelastic component. These are large differences in both magnitude and character that make more detailed comparisons of questionable value.

References, Section V.

V-1. D. Lister, A. Smith and C. Dunford, Phys. Rev., 162 1077(1967); see also J. F. Whalen et al., Argonne Natl. Lab. Report, ANL-7210 (1966).

V-2. E. Arthur et al., to be published (1981).

V-3. G. Grenier, J. Delaroche, S. Joly, Ch. Lagrange and J. Voignier, Neut. capture cross sections of Y, Nb, Gd, W and Au between 0.5 and 3.0 MeV, Proc. Conf. on Nucl. Cross Sections for Technology, Natl. Bureau of Stds. Pub., NBS-SP-594 (1980).

V-4. Brookhaven Natl. Lab. Report, ENDF-102, 2nd edition, Editor R. Kinsey (1979).

V-5. R. C. Martin, P. F. Yergin, R. H. Augustson, N. N. Kaushal, H. A. Medicus and E. J. Winhold, Bull. Am. Phys. Soc., 12, 106(1967).

V-6. D. Foster and D. Glasgow, Phys. Rev., C3 576(1971).

V-7. Brookhaven Natl. Lab. Report, BNL-325, Vol.-II, 3rd edition, Editors D. Garber and R. Kinsey (1976).

V-8. J. Delaroche, G. Haouat, R. Shamu, J. Lachkar, M. Patin, J. Sigaud and J. Chardine, Proc. of Natl. Soviet Conf. on Neutron Physics, Kiev (1977); Also to be published in the Phys. Rev.

V-9. J. Lachkar et al., Proc. of Inter. Conf. on Nuclear Data for Reactors and other Applications, Harwell (1978).

V-10. See R. Lane and R. Thomas, Revs. of Mod. Phys., 30 257(1958).

V-11. Table of Isotopes, 7th edition, Editors C. M. Lederer and V. S. Shirley, Wiley Interscience Pub., New York (1978).

V-12. A. Gilbert and A. Cameron, Can. Jour. Phys., 43 1446(1965).

Table V-1. Total-cross-section Uncertainty Guidelines[a]

E_n (MeV)	± Uncertainty (%)	E_n (MeV)	± Uncertainty (%)
0.1	3.0	5.0	2.0
0.5	2.0	6.0	2.0
1.0	1.5	8.0	3.0
2.0	1.5	10.0	3.5
3.0	1.5	14.0	5.0
4.0	1.5		

[a]Linear energy interpolations are approximately valid.

Figure Captions, Section V.

Fig. V-1. Comparison of measured and evaluated neutron total cross sections of ^{182}W, ^{184}W and ^{186}W from 0.1 to 5.0 MeV. The present evaluation is indicated by a heavy curve and the present experimental results by circular data symbols. Averages of previously reported data are indicated by light curves noted as follows: "W" = 20 keV average of Ref. V-1, "M" = 100 keV average of Ref. V-5, and "F" = 100 keV average of Ref. V-6.

Fig. V-2. Comparison of measured and evaluated neutron total cross sections of ^{182}W, ^{184}W and ^{186}W from 5.0 to 15.0 MeV. The present evaluation is indicated by the heavy curve. Averages of reported experimental results are indicated by light curves as follows: "M" = 100 keV average of Ref. V-5 and "F" = 100 keV average of Ref. V-6.

Fig. V-3. Evaluated differential-elastic-scattering cross sections of ^{182}W, ^{184}W and ^{186}W. Cross sections are given in b/sr and scattering angle in lab.-deg.

Fig. V-4. Outline of present evaluations for ^{182}W, ^{184}W and ^{186}W. Curves indicate the evaluated cross sections identified as follows: 1 = total, 2 = elastic, 4 = total inelastic, 102 = capture and 91 = continuum inelastic. The cumulative envelopes of the discrete-inelastic components are shown by curves. Data points indicate measured elastic-scattering values: <1.5 MeV from Ref. V-1, $\gtrsim 1.5$ MeV from this work.

Fig. V-5. Comparison of components of the present ^{186}W evaluation with those of ENDF/B-V. The heavy curves are from ENDF/B-V and the light ones from the present evaluation. Numbers denote reaction types as follows: 1 = total cross sections, 2 = elastic cross sections, 4 = total inelastic cross sections, and 91 = continuum inelastic cross sections.

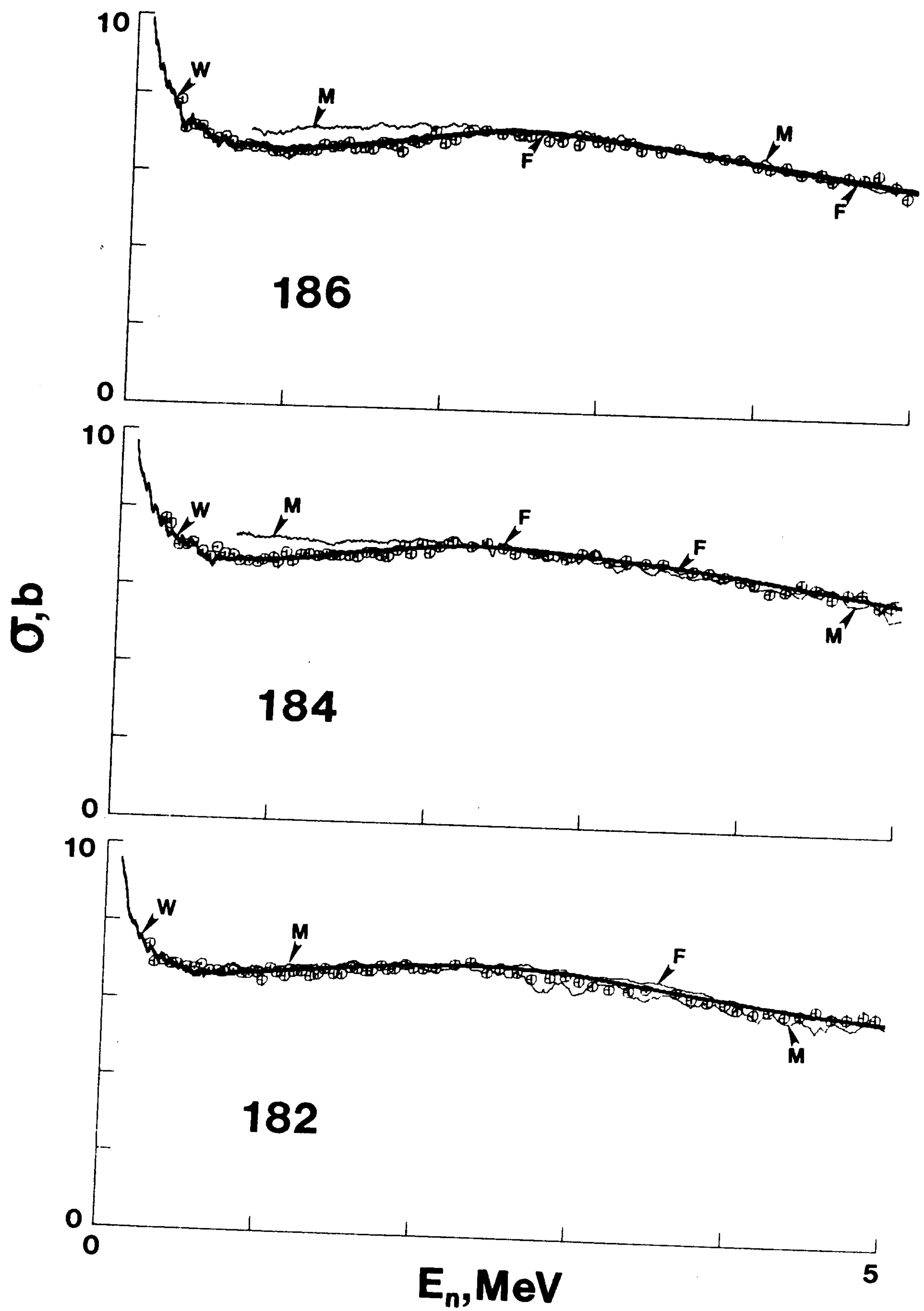


Fig. V-1.

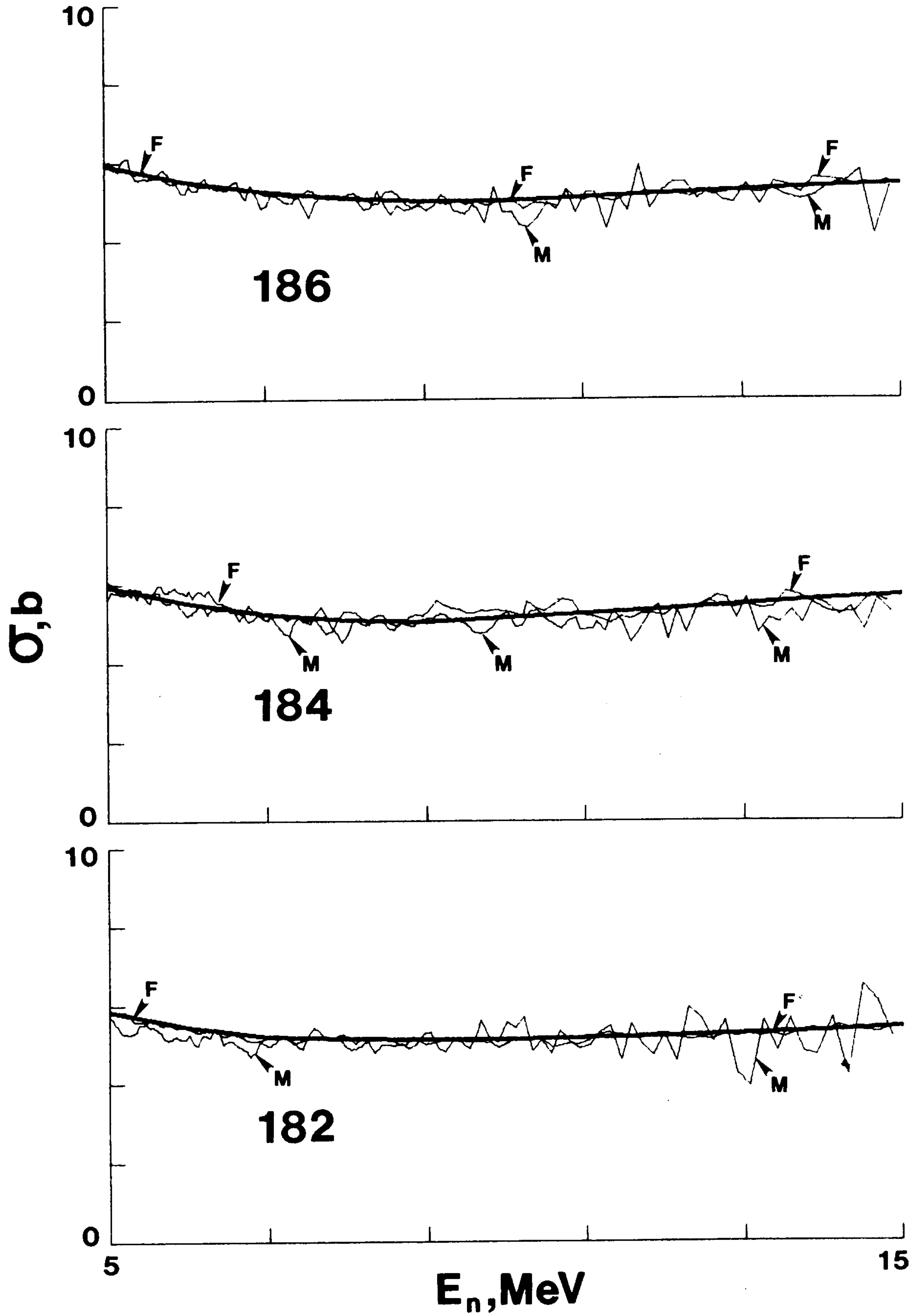


Fig. V-2.

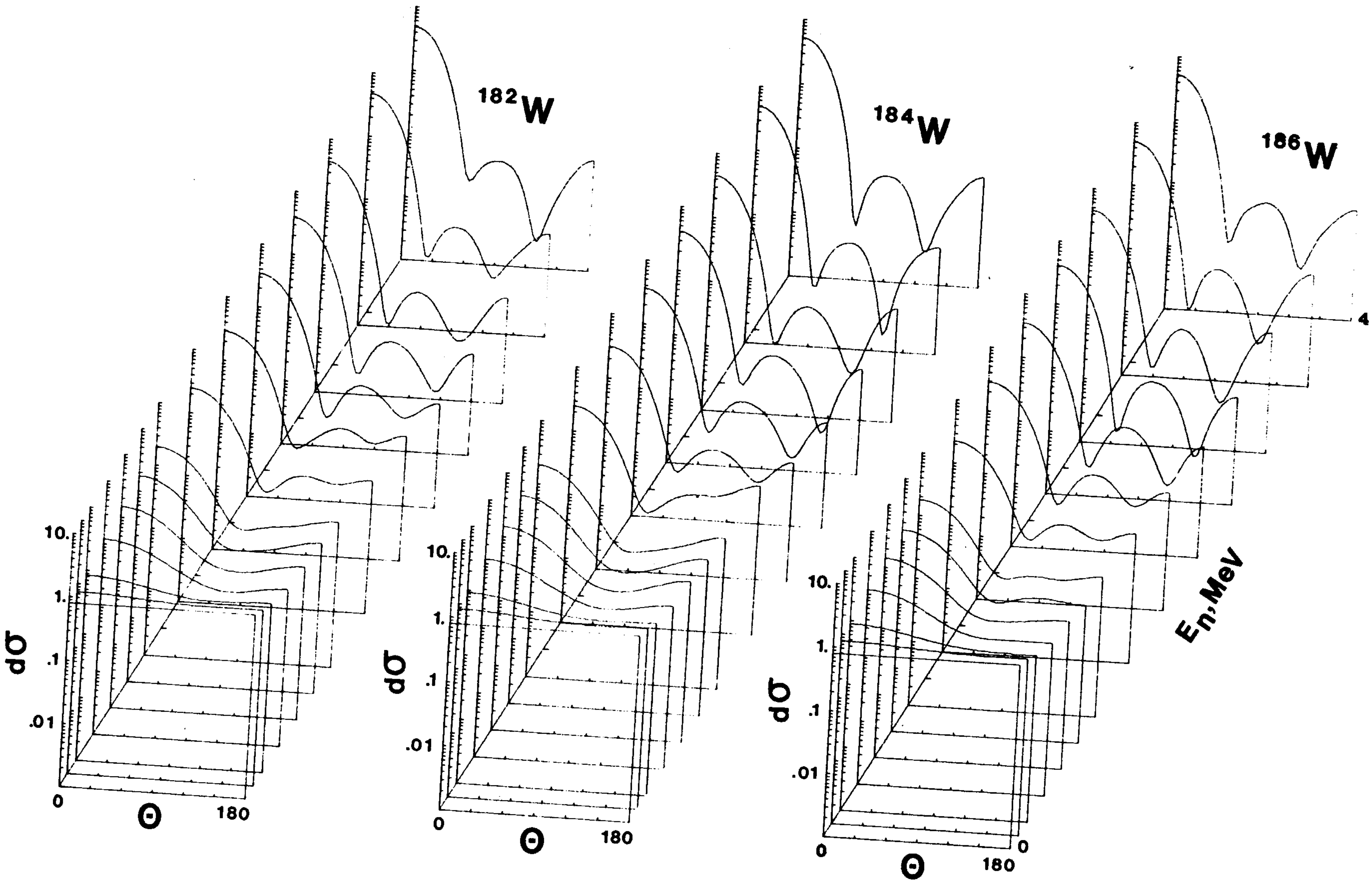
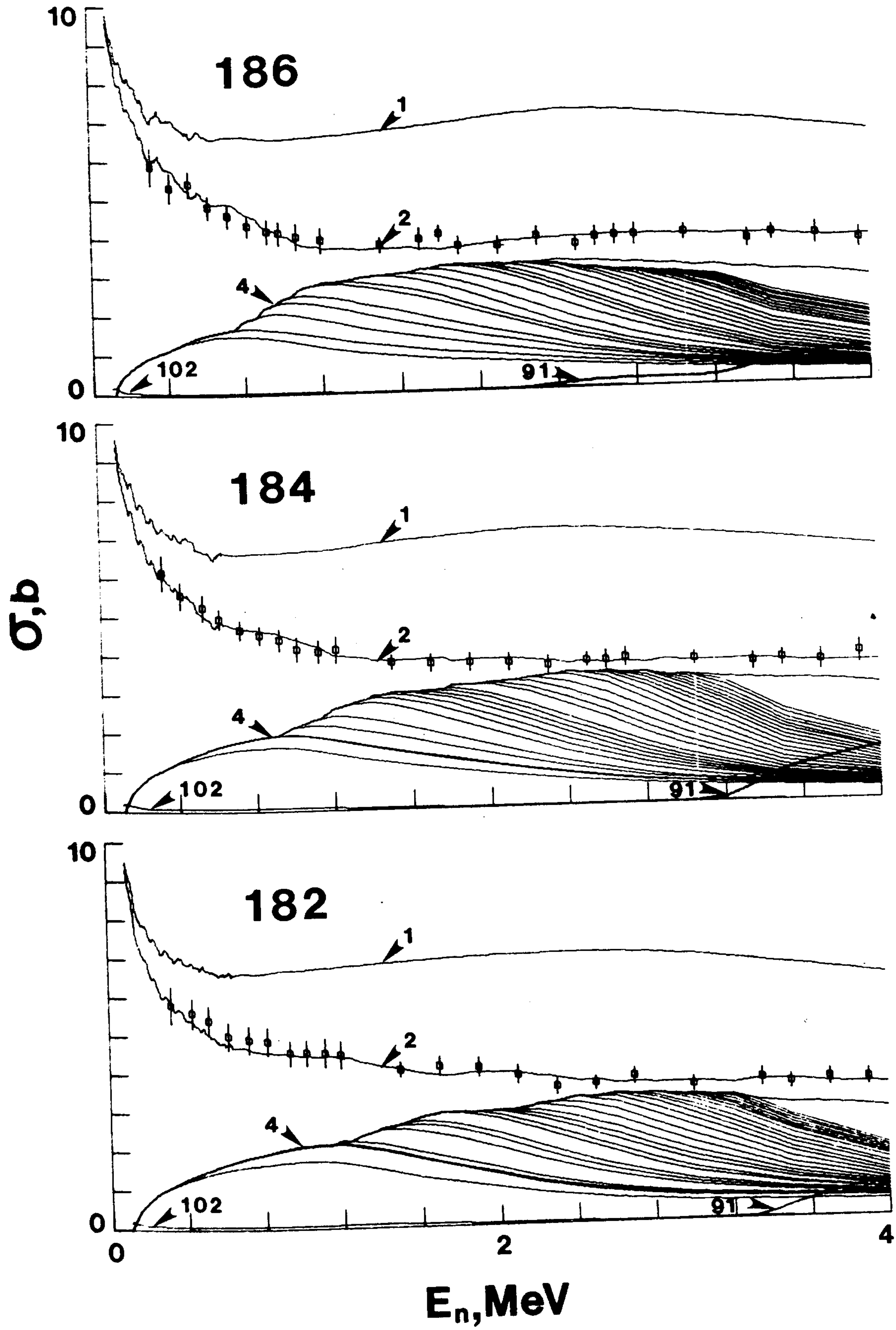


Fig. V-3.



10
186
1
2
4
102
91
0
10
184
1
2
4
102
91
0
σ,b
10
182
1
2
4
102
91
0
0
2
4
En,MeV

Fig. V-4.

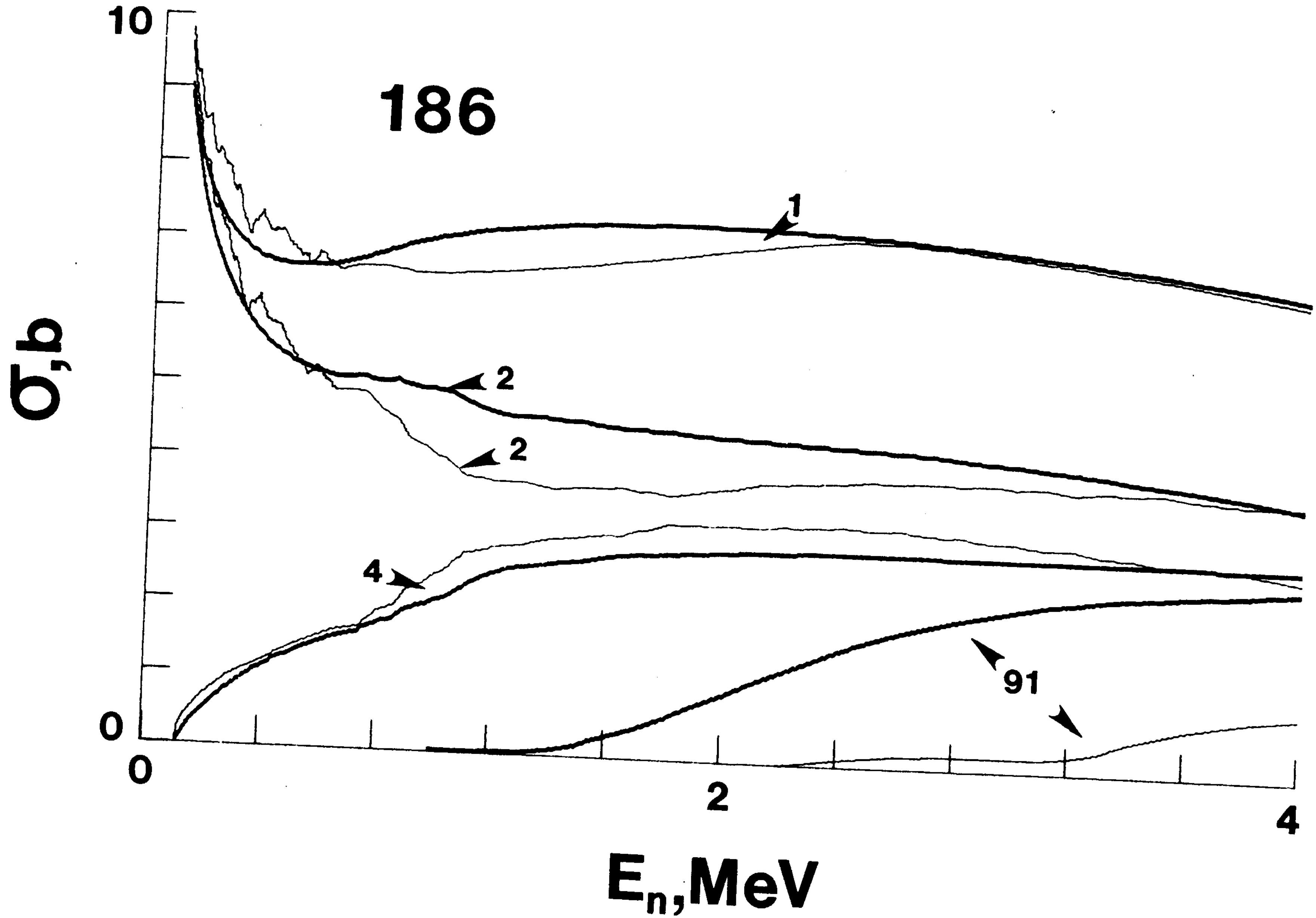


Fig. V-5.

VI. CONCLUDING REMARKS

Results of the present measurements, together with those previously reported from this laboratory (VI-1), define the neutron total cross sections of ^{182}W, ^{184}W and ^{186}W from 0.1 to 5.0 MeV. These results resolve previous experimental uncertainties and high-light the importance of resonance self-shielding effects at low incident energies.

The present measurements and those of Ref. VI-1 determine the neutron-differential-scattering cross sections of those three isotopes from $\approx$0.3 to 4.0 MeV. Approximately thirty scattered-neutron components were observed for each isotope. Prominent of these were the components associated with the ground-state-rotational band (GS). The excitation of levels in that band did not display the anomalous behavior reported in the analogous deformed region near A $\approx$150 (VI-2). The observed scattered-neutron groups were generally consistent with reported level structures of these isotopes (VI-3). An exception was the levels in ^{186}W at excitations of 1.1 to 1.2 MeV.

Results of coupled-channels calculations, coupling (via. β_2 and β_4 terms) the GS band and employing the parameters of Delaroche et al. (VI-4), were generally consistent with the observed neutron total and scattering cross sections. However, detailed discrepancies between measured and calculated neutron total cross sections of ^{182}W suggested a lower quadrupole deformation and/or more complex deformation for this isotope. At low incident energies compound-nucleus contributions to the scattering processes were large and not unambiguously calculable from basic precepts. At higher energies uncertainties associated with conventional statistical-level properties (IV-5) were a concern. Comparisons of measured and calculated cross sections for the excitation of the β- and γ- vibrational bands of ^{186}W suggested that direct excitation of these band members, in addition to those of the GS band, was a factor in the respective inelastic-neutron-scattering processes. The vibrational couplings did influence the selection of the more general model parameters.

Some of the above physical uncertainties might be resolved by additional detailed measurements. Studies of gamma-ray spectra emitted following inelastic-neutron scattering from ^{186}W could resolve level ambiguities at excitation energies of $\approx$1.15 MeV and test the level structure proposed from the boson model (VI-6). Precise determinations of the cross sections for the excitation of the β- and γ- vibrational bands of ^{186}W could illuminate the contributions of vibrational couplings in scattering from such deformed nuclides.

A limited evaluation, largely based upon the present measurements and those of Ref. VI-1, provides a sound foundation for broader-scope evaluation efforts to be reported elsewhere (VI-7).

References, Section VI.

VI-1. D. Lister, A. Smith and C. Dunford, Phys. Rev., 162 1077(1967).

VI-2. D. Coope, S. Tripathi, M. Schell, J. Weil and M. McEllistream, Phys. Rev., C16 2223(1977).

VI-3. Table of Isotopes, 7th Ed., Eds. C. Lederer and V. Shirley, John Wiley and Sons, New York (1978).

VI-4. J. P. Delaroche, G. Haouat, J. Lacklar, Y. Patin, J. Sigund and J. Chardine, Conf. on Nucl. Cross Sections for Technology, Natl. Bureau of Stds. Pub., NBS-SP-594(1980).

VI-5. A. Gilbert and A. Cameron, Can. Jour. of Phys., 43 1446(1965).

VI-6. B. Barrett, Private Communication (1981).

VI-7. E. Arthur et al., to be published, (1981).

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APPENDIX: EXPERIMENTAL EVALUATED DATA SETS

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APPENDIX---

EXPERIMENTAL EVALUATED DATA SETS,

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0.0        0.0                 0          0          4                  182 1451      4
--------------------------------------------------------------------    182 1451      5
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                               3          2        118                1 182 1451     11
                               3          4         25                1 182 1451     12
                               3         51         12                1 182 1451     13
                               3         52          9                1 182 1451     14
                               3         53          5                1 182 1451     15
                               3         54          6                1 182 1451     16
                               3         55          9                1 182 1451     17
                               3         56          8                1 182 1451     18
                               3         57          7                1 182 1451     19
                               3         58          7                1 182 1451     20
                               3         59          6                1 182 1451     21
                               3         60          6                1 182 1451     22
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                               4          2         37                1 182 1451     42
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                               4         60          2
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APPENDIX: EXPERIMENTAL EVALUATED DATA SETS (Contd.)

PAGE A- 2

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						182	0	0	71
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0.1933E+06	0.7849E+01	0.1953E+06	0.7854E+01	0.1983E+06	0.7870E+01	182	3	1	91
0.1993E+06	0.7884E+01	0.2000E+06	0.7875E+01	0.2013E+06	0.7858E+01	182	3	1	92
0.2033E+06	0.7825E+01	0.2043E+06	0.7818E+01	0.2065E+06	0.7817E+01	182	3	1	93
0.2088E+06	0.7777E+01	0.2110E+06	0.7748E+01	0.2132E+06	0.7704E+01	182	3	1	94
0.2155E+06	0.7636E+01	0.2177E+06	0.7606E+01	0.2199E+06	0.7556E+01	182	3	1	95
0.2222E+06	0.7554E+01	0.2254E+06	0.7525E+01	0.2284E+06	0.7500E+01	182	3	1	96
0.2294E+06	0.7488E+01	0.2314E+06	0.7483E+01	0.2334E+06	0.7486E+01	182	3	1	97
0.2354E+06	0.7522E+01	0.2384E+06	0.7524E+01	0.2404E+06	0.7551E+01	182	3	1	98
0.2424E+06	0.7518E+01	0.2444E+06	0.7524E+01	0.2464E+06	0.7525E+01	182	3	1	99
0.2474E+06	0.7535E+01	0.2494E+06	0.7484E+01	0.2500E+06	0.7474E+01	182	3	1	100
0.2514E+06	0.7452E+01	0.2544E+06	0.7438E+01	0.2564E+06	0.7401E+01	182	3	1	101
0.2584E+06	0.7384E+01	0.2594E+06	0.7367E+01	0.2614E+06	0.7346E+01	182	3	1	102
0.2634E+06	0.7352E+01	0.2654E+06	0.7313E+01	0.2674E+06	0.7276E+01	182	3	1	103
0.2694E+06	0.7285E+01	0.2714E+06	0.7285E+01	0.2743E+06	0.7229E+01	182	3	1	104
0.2761E+06	0.7208E+01	0.2780E+06	0.7167E+01	0.2798E+06	0.7145E+01	182	3	1	105
0.2817E+06	0.7132E+01	0.2835E+06	0.7134E+01	0.2854E+06	0.7142E+01	182	3	1	106
0.2872E+06	0.7153E+01	0.2890E+06	0.7149E+01	0.2909E+06	0.7153E+01	182	3	1	107
0.2927E+06	0.7164E+01	0.2937E+06	0.7171E+01	0.2947E+06	0.7169E+01	182	3	1	107

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0.2969E+06	0.7226E+01	0.2991E+06	0.7254E+01	0.3000E+06	0.7253E+01	182	3	1	108
0.3014E+06	0.7251E+01	0.3036E+06	0.7241E+01	0.3058E+06	0.7251E+01	182	3	1	109
0.3080E+06	0.7257E+01	0.3113E+06	0.7241E+01	0.3125E+06	0.7240E+01	182	3	1	110
0.3157E+06	0.7199E+01	0.3177E+06	0.7169E+01	0.3207E+06	0.7145E+01	182	3	1	111
0.3227E+06	0.7133E+01	0.3246E+06	0.7122E+01	0.3286E+06	0.7081E+01	182	3	1	112
0.3306E+06	0.7078E+01	0.3312E+06	0.7075E+01	0.3326E+06	0.7069E+01	182	3	1	113
0.3346E+06	0.7088E+01	0.3365E+06	0.7089E+01	0.3385E+06	0.7067E+01	182	3	1	114
0.3395E+06	0.7062E+01	0.3415E+06	0.7040E+01	0.3435E+06	0.7023E+01	182	3	1	115
0.3455E+06	0.6995E+01	0.3475E+06	0.6963E+01	0.3495E+06	0.6935E+01	182	3	1	116
0.3515E+06	0.6951E+01	0.3535E+06	0.6942E+01	0.3555E+06	0.6946E+01	182	3	1	117
0.3576E+06	0.6987E+01	0.3596E+06	0.7011E+01	0.3616E+06	0.7011E+01	182	3	1	118
0.3636E+06	0.7010E+01	0.3656E+06	0.7004E+01	0.3676E+06	0.7032E+01	182	3	1	119
0.3706E+06	0.7073E+01	0.3716E+06	0.7059E+01	0.3736E+06	0.7073E+01	182	3	1	120
0.3756E+06	0.7065E+01	0.3776E+06	0.7020E+01	0.3796E+06	0.7032E+01	182	3	1	121
0.3806E+06	0.7044E+01	0.3828E+06	0.7037E+01	0.3862E+06	0.7049E+01	182	3	1	122
0.3873E+06	0.7058E+01	0.3895E+06	0.7023E+01	0.3917E+06	0.7004E+01	182	3	1	123
0.3939E+06	0.6987E+01	0.3962E+06	0.6975E+01	0.3984E+06	0.6942E+01	182	3	1	124
0.4000E+06	0.6926E+01	0.4016E+06	0.6909E+01	0.4046E+06	0.6893E+01	182	3	1	125
0.4056E+06	0.6873E+01	0.4076E+06	0.6878E+01	0.4096E+06	0.6888E+01	182	3	1	126
0.4116E+06	0.6888E+01	0.4136E+06	0.6882E+01	0.4156E+06	0.6858E+01	182	3	1	127
0.4176E+06	0.6861E+01	0.4196E+06	0.6860E+01	0.4226E+06	0.6871E+01	182	3	1	128
0.4236E+06	0.6879E+01	0.4246E+06	0.6876E+01	0.4268E+06	0.6885E+01	182	3	1	129
0.4290E+06	0.6868E+01	0.4313E+06	0.6865E+01	0.4335E+06	0.6894E+01	182	3	1	130
0.4357E+06	0.6895E+01	0.4379E+06	0.6919E+01	0.4412E+06	0.6913E+01	182	3	1	131
0.4424E+06	0.6908E+01	0.4456E+06	0.6879E+01	0.4476E+06	0.6869E+01	182	3	1	132
0.4505E+06	0.6855E+01	0.4524E+06	0.6839E+01	0.4533E+06	0.6828E+01	182	3	1	133
0.4543E+06	0.6845E+01	0.4577E+06	0.6817E+01	0.4588E+06	0.6809E+01	182	3	1	134
0.4610E+06	0.6805E+01	0.4632E+06	0.6827E+01	0.4654E+06	0.6842E+01	182	3	1	135
0.4677E+06	0.6823E+01	0.4699E+06	0.6806E+01	0.4711E+06	0.6796E+01	182	3	1	136
0.4699E+06	0.6794E+01	0.4765E+06	0.6806E+01	0.4775E+06	0.6807E+01	182	3	1	137
0.4795E+06	0.6781E+01	0.4815E+06	0.6746E+01	0.4835E+06	0.6735E+01	182	3	1	138
0.4855E+06	0.6733E+01	0.4885E+06	0.6763E+01	0.4905E+06	0.6784E+01	182	3	1	139
0.4923E+06	0.6810E+01	0.4941E+06	0.6832E+01	0.4951E+06	0.6833E+01	182	3	1	140
0.4972E+06	0.6823E+01	0.4992E+06	0.6847E+01	0.5000E+06	0.6856E+01	182	3	1	141
0.5012E+06	0.6870E+01	0.5032E+06	0.6843E+01	0.5063E+06	0.6794E+01	182	3	1	142
0.5083E+06	0.6770E+01	0.5092E+06	0.6763E+01	0.5113E+06	0.6751E+01	182	3	1	143
0.5135E+06	0.6720E+01	0.5174E+06	0.6712E+01	0.5192E+06	0.6718E+01	182	3	1	144
0.5211E+06	0.6709E+01	0.5229E+06	0.6699E+01	0.5247E+06	0.6702E+01	182	3	1	145
0.5256E+06	0.6706E+01	0.5275E+06	0.6712E+01	0.5293E+06	0.6718E+01	182	3	1	146
0.5311E+06	0.6704E+01	0.5329E+06	0.6696E+01	0.5347E+06	0.6689E+01	182	3	1	147
0.5357E+06	0.6668E+01	0.5377E+06	0.6687E+01	0.5406E+06	0.6671E+01	182	3	1	148
0.5433E+06	0.6686E+01	0.5451E+06	0.6695E+01	0.5470E+06	0.6701E+01	182	3	1	149
0.5488E+06	0.6696E+01	0.5506E+06	0.6675E+01	0.5525E+06	0.6681E+01	182	3	1	150
0.5543E+06	0.6682E+01	0.5561E+06	0.6677E+01	0.5580E+06	0.6667E+01	182	3	1	151
0.5588E+06	0.6667E+01	0.5607E+06	0.6666E+01	0.5588E+06	0.6674E+01	182	3	1	152
0.5617E+06	0.6668E+01	0.5637E+06	0.6639E+01	0.5657E+06	0.6635E+01	182	3	1	153
0.5677E+06	0.6626E+01	0.5697E+06	0.6630E+01	0.5717E+06	0.6650E+01	182	3	1	154
0.5737E+06	0.6643E+01	0.5757E+06	0.6625E+01	0.5787E+06	0.6591E+01	182	3	1	155
0.5807E+06	0.6580E+01	0.5827E+06	0.6580E+01	0.5847E+06	0.6590E+01	182	3	1	156
0.5867E+06	0.6590E+01	0.5887E+06	0.6605E+01	0.5907E+06	0.6623E+01	182	3	1	157
0.5927E+06	0.6610E+01	0.5947E+06	0.6590E+01	0.5967E+06	0.6591E+01	182	3	1	158
0.5977E+06	0.6588E+01	0.5997E+06	0.6621E+01	0.6000E+06	0.6624E+01	182	3	1	159
0.6017E+06	0.6641E+01	0.6037E+06	0.6652E+01	0.6057E+06	0.6656E+01	182	3	1	160
0.6077E+06	0.6639E+01	0.6097E+06	0.6612E+01	0.6117E+06	0.6571E+01	182	3	1	161
0.6137E+06	0.6588E+01	0.6157E+06	0.6610E+01	0.6177E+06	0.6626E+01	182	3	1	162
0.6207E+06	0.6627E+01	0.6225E+06	0.6610E+01	0.6243E+06	0.6618E+01	182	3	1	163

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0.6262E+06	0.6620E+01	0.6280E+06	0.6642E+01	0.6307E+06	0.6653E+01	182	3	1	164
0.6326E+06	0.6682E+01	0.6344E+06	0.6681E+01	0.6362E+06	0.6666E+01	182	3	1	165
0.6381E+06	0.6659E+01	0.6389E+06	0.6658E+01	0.6398E+06	0.6657E+01	182	3	1	166
0.6389E+06	0.6653E+01	0.6408E+06	0.6669E+01	0.6418E+06	0.6653E+01	182	3	1	167
0.6428E+06	0.6643E+01	0.6438E+06	0.6625E+01	0.6448E+06	0.6633E+01	182	3	1	168
0.6458E+06	0.6624E+01	0.6468E+06	0.6611E+01	0.6478E+06	0.6557E+01	182	3	1	169
0.6488E+06	0.6597E+01	0.6842E+06	0.6638E+01	0.7000E+06	0.6656E+01	182	3	1	170
0.7500E+06	0.6615E+01	0.8000E+06	0.6633E+01	0.9000E+06	0.6707E+01	182	3	1	171
0.1000E+07	0.6710E+01	0.1100E+07	0.6746E+01	0.1144E+07	0.6762E+01	182	3	1	172
0.1200E+07	0.6782E+01	0.1235E+07	0.6795E+01	0.1250E+07	0.6800E+01	182	3	1	173
0.1300E+07	0.6815E+01	0.1350E+07	0.6832E+01	0.1364E+07	0.6836E+01	182	3	1	174
0.1400E+07	0.6848E+01	0.1451E+07	0.6864E+01	0.1500E+07	0.6880E+01	182	3	1	175
0.1600E+07	0.6908E+01	0.1687E+07	0.6932E+01	0.1700E+07	0.6936E+01	182	3	1	176
0.1750E+07	0.6950E+01	0.1800E+07	0.6960E+01	0.1868E+07	0.6974E+01	182	3	1	177
0.1900E+07	0.6980E+01	0.1924E+07	0.6985E+01	0.1999E+07	0.7000E+01	182	3	1	178
0.2000E+07	0.7000E+01	0.2070E+07	0.7006E+01	0.2164E+07	0.7013E+01	182	3	1	179
0.2200E+07	0.7016E+01	0.2250E+07	0.7020E+01	0.2285E+07	0.7020E+01	182	3	1	180
0.2300E+07	0.7020E+01	0.2395E+07	0.7020E+01	0.2400E+07	0.7020E+01	182	3	1	181
0.2481E+07	0.7020E+01	0.2500E+07	0.7020E+01	0.2556E+07	0.7011E+01	182	3	1	182
0.2600E+07	0.7004E+01	0.2629E+07	0.6999E+01	0.2705E+07	0.6987E+01	182	3	1	183
0.2750E+07	0.6980E+01	0.2783E+07	0.6969E+01	0.2800E+07	0.6964E+01	182	3	1	184
0.2834E+07	0.6953E+01	0.2882E+07	0.6938E+01	0.2948E+07	0.6917E+01	182	3	1	185
0.2995E+07	0.6902E+01	0.3000E+07	0.6900E+01	0.3038E+07	0.6878E+01	182	3	1	186
0.3079E+07	0.6854E+01	0.3200E+07	0.6784E+01	0.3300E+07	0.6726E+01	182	3	1	187
0.3400E+07	0.6668E+01	0.3500E+07	0.6610E+01	0.3600E+07	0.6548E+01	182	3	1	188
0.3700E+07	0.6486E+01	0.3800E+07	0.6424E+01	0.3900E+07	0.6362E+01	182	3	1	189
0.4000E+07	0.6300E+01	0.4500E+07	0.6025E+01	0.5000E+07	0.5835E+01	182	3	1	190
0.6000E+07	0.5420E+01	0.7000E+07	0.5160E+01	0.8000E+07	0.5140E+01	182	3	1	191
0.9000E+07	0.5115E+01	0.1000E+08	0.5100E+01	0.1200E+08	0.5180E+01	182	3	1	192
0.1400E+08	0.5300E+01	0.1500E+08	0.5405E+01	0.0000E-01	0.0000E-01	182	3	1	193
						182	3	0	194
.74182E 05	.18039E 03	0	99	0	0	182	3	2	195
0.0	0.0	0	0	1	343	182	3	2	196
343	2					182	3	2	197
0.1000E+06	0.9308E+01	0.1006E+06	0.9295E+01	0.1110E+06	0.8957E+01	182	3	2	198
0.1130E+06	0.8882E+01	0.1150E+06	0.8821E+01	0.1170E+06	0.8769E+01	182	3	2	199
0.1190E+06	0.8724E+01	0.1211E+06	0.8695E+01	0.1231E+06	0.8620E+01	182	3	2	200
0.1250E+06	0.8584E+01	0.1251E+06	0.8582E+01	0.1271E+06	0.8543E+01	182	3	2	201
0.1291E+06	0.8490E+01	0.1311E+06	0.8399E+01	0.1331E+06	0.8329E+01	182	3	2	202
0.1351E+06	0.8244E+01	0.1371E+06	0.8181E+01	0.1391E+06	0.8096E+01	182	3	2	203
0.1412E+06	0.7989E+01	0.1432E+06	0.7905E+01	0.1452E+06	0.7798E+01	182	3	2	204
0.1472E+06	0.7667E+01	0.1500E+06	0.7593E+01	0.1502E+06	0.7588E+01	182	3	2	205
0.1512E+06	0.7576E+01	0.1532E+06	0.7543E+01	0.1552E+06	0.7516E+01	182	3	2	206
0.1574E+06	0.7457E+01	0.1584E+06	0.7431E+01	0.1607E+06	0.7375E+01	182	3	2	207
0.1629E+06	0.7346E+01	0.1651E+06	0.7307E+01	0.1674E+06	0.7322E+01	182	3	2	208
0.1696E+06	0.7290E+01	0.1718E+06	0.7246E+01	0.1741E+06	0.7201E+01	182	3	2	209
0.1750E+06	0.7181E+01	0.1773E+06	0.7130E+01	0.1803E+06	0.7098E+01	182	3	2	210
0.1813E+06	0.7097E+01	0.1833E+06	0.7097E+01	0.1853E+06	0.7103E+01	182	3	2	211
0.1883E+06	0.7070E+01	0.1903E+06	0.7052E+01	0.1913E+06	0.7038E+01	182	3	2	212
0.1933E+06	0.7018E+01	0.1953E+06	0.7014E+01	0.1983E+06	0.7017E+01	182	3	2	213
0.1993E+06	0.7026E+01	0.2000E+06	0.7014E+01	0.2013E+06	0.6992E+01	182	3	2	214
0.2033E+06	0.6952E+01	0.2043E+06	0.6942E+01	0.2065E+06	0.6933E+01	182	3	2	215
0.2088E+06	0.6885E+01	0.2110E+06	0.6848E+01	0.2132E+06	0.6796E+01	182	3	2	216
0.2155E+06	0.6720E+01	0.2177E+06	0.6682E+01	0.2199E+06	0.6624E+01	182	3	2	217
0.2222E+06	0.6614E+01	0.2254E+06	0.6573E+01	0.2284E+06	0.6537E+01	182	3	2	218
0.2294E+06	0.6522E+01	0.2314E+06	0.6510E+01	0.2334E+06	0.6505E+01	182	3	2	219

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0.2354E+06	0.6534E+01	0.2384E+06	0.6526E+01	0.2404E+06	0.6545E+01	182	3	2	220
0.2424E+06	0.6505E+01	0.2444E+06	0.6504E+01	0.2464E+06	0.6498E+01	182	3	2	221
0.2474E+06	0.6504E+01	0.2494E+06	0.6446E+01	0.2500E+06	0.6434E+01	182	3	2	222
0.2514E+06	0.6408E+01	0.2544E+06	0.6386E+01	0.2564E+06	0.6343E+01	182	3	2	223
0.2584E+06	0.6320E+01	0.2594E+06	0.6300E+01	0.2614E+06	0.6274E+01	182	3	2	224
0.2634E+06	0.6274E+01	0.2654E+06	0.6230E+01	0.2674E+06	0.6187E+01	182	3	2	225
0.2694E+06	0.6190E+01	0.2714E+06	0.6185E+01	0.2743E+06	0.6120E+01	182	3	2	226
0.2761E+06	0.6094E+01	0.2780E+06	0.6046E+01	0.2798E+06	0.6021E+01	182	3	2	227
0.2817E+06	0.6003E+01	0.2835E+06	0.6000E+01	0.2854E+06	0.6002E+01	182	3	2	228
0.2872E+06	0.6008E+01	0.2890E+06	0.5999E+01	0.2909E+06	0.5998E+01	182	3	2	229
0.2927E+06	0.6004E+01	0.2937E+06	0.6008E+01	0.2947E+06	0.6003E+01	182	3	2	230
0.2969E+06	0.6054E+01	0.2991E+06	0.6076E+01	0.3000E+06	0.6072E+01	182	3	2	231
0.3014E+06	0.6067E+01	0.3036E+06	0.6053E+01	0.3058E+06	0.6059E+01	182	3	2	232
0.3080E+06	0.6061E+01	0.3113E+06	0.6039E+01	0.3125E+06	0.6036E+01	182	3	2	233
0.3157E+06	0.5989E+01	0.3177E+06	0.5955E+01	0.3207E+06	0.5926E+01	182	3	2	234
0.3227E+06	0.5910E+01	0.3246E+06	0.5895E+01	0.3286E+06	0.5847E+01	182	3	2	235
0.3306E+06	0.5840E+01	0.3312E+06	0.5836E+01	0.3326E+06	0.5827E+01	182	3	2	236
0.3346E+06	0.5841E+01	0.3365E+06	0.5837E+01	0.3385E+06	0.5811E+01	182	3	2	237
0.3395E+06	0.5803E+01	0.3415E+06	0.5776E+01	0.3435E+06	0.5755E+01	182	3	2	238
0.3455E+06	0.5722E+01	0.3475E+06	0.5685E+01	0.3495E+06	0.5652E+01	182	3	2	239
0.3515E+06	0.5664E+01	0.3535E+06	0.5650E+01	0.3555E+06	0.5649E+01	182	3	2	240
0.3576E+06	0.5685E+01	0.3596E+06	0.5704E+01	0.3616E+06	0.5700E+01	182	3	2	241
0.3636E+06	0.5694E+01	0.3656E+06	0.5683E+01	0.3676E+06	0.5706E+01	182	3	2	242
0.3706E+06	0.5740E+01	0.3716E+06	0.5724E+01	0.3736E+06	0.5733E+01	182	3	2	243
0.3756E+06	0.5720E+01	0.3776E+06	0.5670E+01	0.3796E+06	0.5678E+01	182	3	2	244
0.3806E+06	0.5687E+01	0.3828E+06	0.5675E+01	0.3862E+06	0.5679E+01	182	3	2	245
0.3873E+06	0.5685E+01	0.3895E+06	0.5645E+01	0.3917E+06	0.5621E+01	182	3	2	246
0.3939E+06	0.5599E+01	0.3962E+06	0.5581E+01	0.3984E+06	0.5543E+01	182	3	2	247
0.4000E+06	0.5523E+01	0.4016E+06	0.5503E+01	0.4046E+06	0.5480E+01	182	3	2	248
0.4056E+06	0.5458E+01	0.4076E+06	0.5459E+01	0.4096E+06	0.5465E+01	182	3	2	249
0.4116E+06	0.5461E+01	0.4136E+06	0.5451E+01	0.4156E+06	0.5422E+01	182	3	2	250
0.4176E+06	0.5421E+01	0.4196E+06	0.5416E+01	0.4226E+06	0.5421E+01	182	3	2	251
0.4236E+06	0.5427E+01	0.4246E+06	0.5422E+01	0.4268E+06	0.5426E+01	182	3	2	252
0.4290E+06	0.5424E+01	0.4313E+06	0.5417E+01	0.4335E+06	0.5421E+01	182	3	2	253
0.4357E+06	0.5417E+01	0.4379E+06	0.5437E+01	0.4412E+06	0.5424E+01	182	3	2	254
0.4424E+06	0.5416E+01	0.4456E+06	0.5381E+01	0.4476E+06	0.5367E+01	182	3	2	255
0.4505E+06	0.5346E+01	0.4524E+06	0.5326E+01	0.4533E+06	0.5314E+01	182	3	2	256
0.4543E+06	0.5329E+01	0.4577E+06	0.5293E+01	0.4588E+06	0.5283E+01	182	3	2	257
0.4610E+06	0.5275E+01	0.4632E+06	0.5292E+01	0.4654E+06	0.5302E+01	182	3	2	258
0.4677E+06	0.5279E+01	0.4711E+06	0.5244E+01	0.4699E+06	0.5245E+01	182	3	2	259
0.4765E+06	0.5243E+01	0.4775E+06	0.5242E+01	0.4795E+06	0.5212E+01	182	3	2	260
0.4815E+06	0.5173E+01	0.4835E+06	0.5157E+01	0.4855E+06	0.5151E+01	182	3	2	261
0.4885E+06	0.5175E+01	0.4905E+06	0.5192E+01	0.4923E+06	0.5214E+01	182	3	2	262
0.4941E+06	0.5232E+01	0.4951E+06	0.5231E+01	0.4972E+06	0.5217E+01	182	3	2	263
0.4992E+06	0.5237E+01	0.5000E+06	0.5244E+01	0.5012E+06	0.5256E+01	182	3	2	264
0.5032E+06	0.5225E+01	0.5063E+06	0.5171E+01	0.5083E+06	0.5143E+01	182	3	2	265
0.5092E+06	0.5135E+01	0.5113E+06	0.5119E+01	0.5135E+06	0.5084E+01	182	3	2	266
0.5174E+06	0.5069E+01	0.5192E+06	0.5072E+01	0.5211E+06	0.5059E+01	182	3	2	267
0.5229E+06	0.5046E+01	0.5247E+06	0.5046E+01	0.5256E+06	0.5048E+01	182	3	2	268
0.5275E+06	0.5051E+01	0.5293E+06	0.5054E+01	0.5311E+06	0.5036E+01	182	3	2	269
0.5329E+06	0.5025E+01	0.5347E+06	0.5015E+01	0.5357E+06	0.4992E+01	182	3	2	270
0.5377E+06	0.5006E+01	0.5406E+06	0.4986E+01	0.5433E+06	0.4996E+01	182	3	2	271
0.5451E+06	0.5002E+01	0.5470E+06	0.5005E+01	0.5488E+06	0.4997E+01	182	3	2	272
0.5506E+06	0.4972E+01	0.5525E+06	0.4975E+01	0.5543E+06	0.4973E+01	182	3	2	273
0.5561E+06	0.4965E+01	0.5580E+06	0.4951E+01	0.5607E+06	0.4945E+01	182	3	2	274
0.5588E+06	0.4957E+01	0.5617E+06	0.4946E+01	0.5637E+06	0.4913E+01	182	3	2	275

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0.5657E+06	0.4905E+01	0.5677E+06	0.4893E+01	0.5697E+06	0.4893E+01	182	3	2	276
0.5717E+06	0.4910E+01	0.5737E+06	0.4899E+01	0.5757E+06	0.4877E+01	182	3	2	277
0.5787E+06	0.4838E+01	0.5807E+06	0.4824E+01	0.5827E+06	0.4820E+01	182	3	2	278
0.5847E+06	0.4826E+01	0.5867E+06	0.4823E+01	0.5887E+06	0.4834E+01	182	3	2	279
0.5907E+06	0.4849E+01	0.5927E+06	0.4832E+01	0.5947E+06	0.4808E+01	182	3	2	280
0.5967E+06	0.4806E+01	0.5977E+06	0.4801E+01	0.5997E+06	0.4831E+01	182	3	2	281
0.6000E+06	0.4833E+01	0.6017E+06	0.4848E+01	0.6037E+06	0.4856E+01	182	3	2	282
0.6057E+06	0.4857E+01	0.6077E+06	0.4837E+01	0.6097E+06	0.4807E+01	182	3	2	283
0.6117E+06	0.4763E+01	0.6137E+06	0.4777E+01	0.6157E+06	0.4797E+01	182	3	2	284
0.6177E+06	0.4810E+01	0.6207E+06	0.4806E+01	0.6225E+06	0.4787E+01	182	3	2	285
0.6243E+06	0.4792E+01	0.6262E+06	0.4792E+01	0.6280E+06	0.4811E+01	182	3	2	286
0.6307E+06	0.4818E+01	0.6326E+06	0.4845E+01	0.6344E+06	0.4841E+01	182	3	2	287
0.6362E+06	0.4823E+01	0.6381E+06	0.4814E+01	0.6398E+06	0.4809E+01	182	3	2	288
0.6389E+06	0.4807E+01	0.6408E+06	0.4820E+01	0.6418E+06	0.4802E+01	182	3	2	289
0.6428E+06	0.4791E+01	0.6438E+06	0.4772E+01	0.6448E+06	0.4778E+01	182	3	2	290
0.6458E+06	0.4768E+01	0.6468E+06	0.4753E+01	0.6478E+06	0.4698E+01	182	3	2	291
0.6488E+06	0.4736E+01	0.6842E+06	0.4727E+01	0.7000E+06	0.4721E+01	182	3	2	292
0.7500E+06	0.4625E+01	0.8000E+06	0.4589E+01	0.9000E+06	0.4551E+01	182	3	2	293
0.1000E+07	0.4476E+01	0.1100E+07	0.4465E+01	0.1144E+07	0.4476E+01	182	3	2	294
0.1200E+07	0.4410E+01	0.1235E+07	0.4437E+01	0.1250E+07	0.4406E+01	182	3	2	295
0.1300E+07	0.4304E+01	0.1350E+07	0.4250E+01	0.1364E+07	0.4236E+01	182	3	2	296
0.1400E+07	0.4174E+01	0.1451E+07	0.4151E+01	0.1500E+07	0.4101E+01	182	3	2	297
0.1600E+07	0.3977E+01	0.1687E+07	0.3919E+01	0.1700E+07	0.3907E+01	182	3	2	298
0.1750E+07	0.3916E+01	0.1800E+07	0.3922E+01	0.1868E+07	0.3969E+01	182	3	2	299
0.1900E+07	0.3967E+01	0.1924E+07	0.3972E+01	0.1999E+07	0.3951E+01	182	3	2	300
0.2000E+07	0.3949E+01	0.2070E+07	0.3965E+01	0.2164E+07	0.3890E+01	182	3	2	301
0.2200E+07	0.3830E+01	0.2250E+07	0.3821E+01	0.2285E+07	0.3812E+01	182	3	2	302
0.2300E+07	0.3791E+01	0.2395E+07	0.3697E+01	0.2400E+07	0.3689E+01	182	3	2	303
0.2481E+07	0.3708E+01	0.2500E+07	0.3699E+01	0.2556E+07	0.3653E+01	182	3	2	304
0.2600E+07	0.3600E+01	0.2629E+07	0.3618E+01	0.2705E+07	0.3638E+01	182	3	2	305
0.2750E+07	0.3623E+01	0.2783E+07	0.3606E+01	0.2800E+07	0.3593E+01	182	3	2	306
0.2834E+07	0.3610E+01	0.2882E+07	0.3617E+01	0.2948E+07	0.3613E+01	182	3	2	307
0.2995E+07	0.3597E+01	0.3000E+07	0.3593E+01	0.3038E+07	0.3596E+01	182	3	2	308
0.3079E+07	0.3587E+01	0.3200E+07	0.3532E+01	0.3300E+07	0.3606E+01	182	3	2	309
0.3400E+07	0.3613E+01	0.3500E+07	0.3615E+01	0.3600E+07	0.3552E+01	182	3	2	310
0.3700E+07	0.3511E+01	0.3800E+07	0.3490E+01	0.3900E+07	0.3479E+01	182	3	2	311
0.4000E+07	0.3468E+01					182	3	2	312
						182	3	0	313
.74182E 05	.18039E 03	0	99	0	0	182	3	4	314
0.0	-.10010E 06	0	0	1	64	182	3	4	315
64	2					182	3	4	316
0.1006E+06	0.0000E-01	0.1250E+06	0.2700E+00	0.1500E+06	0.5100E+00	182	3	4	317
0.2000E+06	0.7600E+00	0.2500E+06	0.9450E+00	0.3000E+06	0.1090E+01	182	3	4	318
0.3312E+06	0.1151E+01	0.4000E+06	0.1320E+01	0.5000E+06	0.1535E+01	182	3	4	319
0.6000E+06	0.1715E+01	0.6842E+06	0.1831E+01	0.7000E+06	0.1854E+01	182	3	4	320
0.8000E+06	0.1962E+01	0.9000E+06	0.2074E+01	0.1000E+07	0.2145E+01	182	3	4	321
0.1100E+07	0.2189E+01	0.1144E+07	0.2193E+01	0.1200E+07	0.2278E+01	182	3	4	322
0.1235E+07	0.2263E+01	0.1300E+07	0.2415E+01	0.1364E+07	0.2503E+01	182	3	4	323
0.1400E+07	0.2579E+01	0.1451E+07	0.2621E+01	0.1500E+07	0.2690E+01	182	3	4	324
0.1600E+07	0.2847E+01	0.1687E+07	0.2934E+01	0.1700E+07	0.2951E+01	182	3	4	325
0.1800E+07	0.2966E+01	0.1868E+07	0.2936E+01	0.1900E+07	0.2946E+01	182	3	4	326
0.1924E+07	0.2948E+01	0.1999E+07	0.2988E+01	0.2000E+07	0.2990E+01	182	3	4	327
0.2070E+07	0.2982E+01	0.2164E+07	0.3066E+01	0.2200E+07	0.3130E+01	182	3	4	328
0.2285E+07	0.3154E+01	0.2300E+07	0.3176E+01	0.2395E+07	0.3272E+01	182	3	4	329
0.2400E+07	0.3280E+01	0.2481E+07	0.3264E+01	0.2500E+07	0.3273E+01	182	3	4	330
0.2556E+07	0.3311E+01	0.2600E+07	0.3359E+01	0.2629E+07	0.3336E+01	182	3	4	331

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0.2705E+07 0.3306E+01 0.2783E+07 0.3322E+01 0.2800E+07 0.3331E+01 182 3  4  332
0.2834E+07 0.3304E+01 0.2862E+07 0.3283E+01 0.2948E+07 0.3268E+01 182 3  4  333
0.2995E+07 0.3270E+01 0.3000E+07 0.3272E+01 0.3038E+07 0.3248E+01 182 3  4  334
0.3079E+07 0.3234E+01 0.3200E+07 0.3222E+01 0.3300E+07 0.3093E+01 182 3  4  335
0.3400E+07 0.3031E+01 0.3500E+07 0.2974E+01 0.3600E+07 0.2977E+01 182 3  4  336
0.3700E+07 0.2959E+01 0.3800E+07 0.2920E+01 0.3900E+07 0.2872E+01 182 3  4  337
0.4000E+07 0.2824E+01                                             182 3  4  338
                                                                  182 3  0  339
.74182E 05 .18039E 03          0          1          0          0 182 3 51  340
0.0       -.10010E 06          0          0          1         25 182 3 51  341
        26          2                                             182 3 51  342
0.1006E+06 0.0000E-00 0.1250E+06 0.2700E+00 0.1500E+06 0.5100E+00 182 3 51  343
0.2000E+06 0.7600E+00 0.2500E+06 0.9450E+00 0.3000E+06 0.1090E+01 182 3 51  344
0.4000E+06 0.1285E+01 0.5000E+06 0.1440E+01 0.6000E+06 0.1560E+01 182 3 51  345
0.7000E+06 0.1638E+01 0.8000E+06 0.1680E+01 0.9000E+06 0.1735E+01 182 3 51  346
0.1000E+07 0.1750E+01 0.1100E+07 0.1750E+01 0.1200E+07 0.1715E+01 182 3 51  347
0.1400E+07 0.1500E+01 0.1600E+07 0.1280E+01 0.1800E+07 0.1120E+01 182 3 51  348
0.2000E+07 0.9700E+00 0.2200E+07 0.8200E+00 0.2400E+07 0.7200E+00 182 3 51  349
0.2600E+07 0.6400E+00 0.2800E+07 0.5700E+00 0.3000E+07 0.5100E+00 182 3 51  350
0.3500E+07 0.4500E+00 0.4000E+07 0.4200E+00 0.0000E-01 0.0000E-01 182 3 51  351
                                                                  182 3  0  352
.74182E 05 .18039E 03          0          2          0          0 182 3 52  353
0.0       -.32940E 06          0          0          1         16 182 3 52  354
        16          2                                             182 3 52  355
0.3312E+06 0.0000E-01 0.4000E+06 0.3500E-01 0.6000E+06 0.1550E+00 182 3 52  356
0.8000E+06 0.2750E+00 0.1000E+07 0.3750E+00 0.1200E+07 0.4550E+00 182 3 52  357
0.1300E+07 0.4850E+00 0.1400E+07 0.4970E+00 0.1500E+07 0.4900E+00 182 3 52  358
0.1600E+07 0.4650E+00 0.1800E+07 0.4000E+00 0.2000E+07 0.3300E+00 182 3 52  359
0.2500E+07 0.1810E+00 0.3000E+07 0.1180E+00 0.3500E+07 0.9500E-01 182 3 52  360
0.4000E+07 0.8500E-01 0.0000E-01 0.0000E-01 0.0000E-01 0.0000E-01 182 3 52  361
                                                                  182 3  0  362
.74182E 05 .18039E 03          0          3          0          0 182 3 53  363
0.0       -.68050E 06          0          0          1          6 182 3 53  364
         6          2                                             182 3 53  365
0.6842E+06 0.0000E-01 0.1000E+07 0.2000E-01 0.1500E+07 0.4000E-01 182 3 53  366
0.2000E+07 0.5000E-01 0.3000E+07 0.3000E-01 0.4000E+07 0.2000E-01 182 3 53  367
                                                                  182 3  0  368
.74182E 05 .18039E 03          0          4          0          0 182 3 54  369
0.0       -.11377E 07          0          0          1          9 182 3 54  370
         9          2                                             182 3 54  371
0.1144E+07 0.0000E-01 0.1200E+07 0.8000E-01 0.1400E+07 0.1400E+00 182 3 54  372
0.1600E+07 0.1400E+00 0.1800E+07 0.1300E+00 0.2000E+07 0.1190E+00 182 3 54  373
0.2500E+07 0.7500E-01 0.3000E+07 0.3800E-01 0.4000E+07 0.2000E-01 182 3 54  374
                                                                  182 3  0  375
.74182E 05 .18039E 03          0          5          0          0 182 3 55  376
0.0       -.12282E 07          0          0          1         17 182 3 55  377
        17          2                                             182 3 55  378
0.1235E+07 0.0000E-01 0.1300E+07 0.1800E+00 0.1400E+07 0.3800E+00 182 3 55  379
0.1500E+07 0.5000E+00 0.1600E+07 0.5600E+00 0.1700E+07 0.5800E+00 182 3 55  380
0.1800E+07 0.5500E+00 0.1900E+07 0.5600E+00 0.2000E+07 0.5300E+00 182 3 55  381
0.2200E+07 0.4700E+00 0.2400E+07 0.3950E+00 0.2600E+07 0.3200E+00 182 3 55  382
0.2800E+07 0.2500E+00 0.3000E+07 0.2000E+00 0.3400E+07 0.1210E+00 182 3 55  383
0.3600E+07 0.9500E-01 0.4000E+07 0.3800E-01 0.0000E-01 0.0000E-01 182 3 55  384
                                                                  182 3  0  385
.74182E 05 .18039E 03          0          6          0          0 182 3 56  386
0.0       -.13565E 07          0          0          1         13 182 3 56  387
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                                                                   182 3 56  388
      13           2
0,1364E+07 0,0000E-01 0,1500E+07 0,1000E-00 0.1600E+07 0,1700E+00 182 3 56  389
0,1700E+07 0,2050E+00 0,1800E+07 0.2200E+00 0.1900E+07 0,2300E+00 182 3 56  390
0,2000E+07 0,2300E+00 0,2200E+07 0.1950E+00 0.2400E+07 0.1600E+00 182 3 56  391
0,2600E+07 0,1300E+00 0,3000E+07 0.7900E-01 0.3500E+07 0.4000E-01 182 3 56  392
0,4000E+07 0,2500E-01 0,0000E-01 0,0000E-01 0.0000E-01 0,0000E-01 182 3 56  393
                                                                   182 3  0  394
,74182E 05 ,18039E 03          0          7          0          0 182 3 57  395
0.0        -,14281E 07          0          0          1         10 182 3 57  396
                                                                   182 3 57  397
      10           2
0.1451E+07 0,0000E-01 0,1600E+07 0,9000E-01 0.1800E+07 0,1300E+00 182 3 57  398
0.2000E+07 0,1450E+00 0,2200E+07 0,1450E+00 0.2400E+07 0,1370E+00 182 3 57  399
0,2600E+07 0,1210E+00 0,3000E+07 0,8100E-01 0.3500E+07 0,4000E-01 182 3 57  400
0,4000E+07 0,2200E-01 0,0000E-01 0.0000E-01 0,0000E-01 0,0000E-01 182 3 57  401
                                                                   182 3  0  402
,74182E 05 ,18039E 03          0          8          0          0 182 3 58  403
0.0        -,14918E 07          0          0          1         12 182 3 58  404
                                                                   182 3 58  405
      12           2
0,1500E+07 0,0000E-01 0,1600E+07 0,1000E-00 0,1700E+07 0,2400E+00 182 3 58  406
0,1800E+07 0,3050E+00 0.2000E+07 0,3800E+00 0.2200E+07 0.4050E+00 182 3 58  407
0.2400E+07 0,3900E+00 0,2600E+07 0,3400E+00 0.2800E+07 0,2600E+00 182 3 58  408
0,3000E+07 0,2000E+00 0,3500E+07 0,1000E-00 0.4000E+07 0,5600E-01 182 3 58  409
                                                                   182 3  0  410
,74182E 05 ,18039E 03          0          9          0          0 182 3 59  411
0,0        -,16777E 07          0          0          1          9 182 3 59  412
                                                                   182 3 59  413
       9           2
0,1687E+07 0,0000E-01 0,1800E+07 0,3500E-01 0.2000E+07 0,1050E+00 182 3 59  414
0,2200E+07 0,1400E+00 0,2400E+07 0,1450E+00 0.2600E+07 0,1420E+00 182 3 59  415
0.3000E+07 0,1050E+00 0,3500E+07 0,4900E-01 0.4000E+07 0,2500E-01 182 3 59  416
                                                                   182 3  0  417
,74182E 05 ,18039E 03          0         10          0          0 182 3 60  418
0,0        -,18577E 07          0          0          1          9 182 3 60  419
                                                                   182 3 60  420
       9           2
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0,2400E+07 0,1900E+00 0,2600E+07 0,1900E+00 0.2800E+07 0,1860E+00 182 3 60  422
0,3000E+07 0,1650E+00 0,3500E+07 0.9000E-01 0.4000E+07 0,3800E-01 182 3 60  423
                                                                   182 3  0  424
,74182E 05 ,18039E 03          0         11          0          0 182 3 61  425
0,0        -,19134E 07          0          0          1          9 182 3 61  426
                                                                   182 3 61  427
       9           2
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0,2400E+07 0,1350E+00 0,2600E+07 0,1400E+00 0.2800E+07 0,1300E+00 182 3 61  429
0,3000E+07 0,1180E+00 0,3500E+07 0.7200E-01 0.4000E+07 0,3000E-01 182 3 61  430
                                                                   182 3  0  431
,74182E 05 ,18039E 03          0         12          0          0 182 3 62  432
0,0        -,19887E 07          0          0          1          8 182 3 62  433
                                                                   182 3 62  434
       8           2
0,1999E+07 0,0000E-01 0,2200E+07 0,1150E+00 0,2400E+07 0,1600E+00 182 3 62  435
0,2600E+07 0,1800E+00 0,2800E+07 0,1800E+00 0,3000E+07 0,1700E+00 182 3 62  436
0,3500E+07 0,9000E-01 0,4000E+07 0,4000E-01 0.0000E-01 0,0000E-01 182 3 62  437
                                                                   182 3  0  438
,74182E 05 ,18039E 03          0         13          0          0 182 3 63  439
0.0        -,20586E 07          0          0          1          8 182 3 63  440
                                                                   182 3 63  441
       8           2
0,2070E+07 0,0000E-01 0,2200E+07 0,1300E+00 0.2400E+07 0,2100E+00 182 3 63  442
0,2600E+07 0,2350E+00 0,2800E+07 0,2150E+00 0.3000E+07 0,1800E+00 182 3 63  443
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APPENDIX: EXPERIMENTAL EVALUATED DATA SETS (Contd.)

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0.3500E+07	0.1000E-00	0.4000E+07	0.5500E-01	0.0000E-01	0.0000E-01	182	3	63	444
						182	3	0	445
.74182E 05	.18039E 03	0	14	0	0	182	3	64	446
0.0	-.21522E 07	0	0	1	8	182	3	64	447
8	2					182	3	64	448
0.2164E+07	0.0000E-01	0.2300E+07	0.1200E+00	0.2400E+07	0.1650E+00	182	3	64	449
0.2600E+07	0.2100E+00	0.2600E+07	0.2150E+00	0.3000E+07	0.2070E+00	182	3	64	450
0.3500E+07	0.1300E+00	0.4000E+07	0.7000E-01			182	3	64	451
						182	3	0	452
.74182E 05	.18039E 03	0	15	0	0	182	3	65	453
0.0	-.22725E 07	0	0	1	8	182	3	65	454
8	2					182	3	65	455
0.2285E+07	0.0000E-01	0.2400E+07	0.1330E+00	0.2600E+07	0.2043E+00	182	3	65	456
0.2800E+07	0.2280E+00	0.3000E+07	0.2289E+00	0.3200E+07	0.2043E+00	182	3	65	457
0.3500E+07	0.1472E+00	0.4000E+07	0.7600E-01			182	3	65	458
						182	3	0	459
.74182E 05	.18039E 03	0	16	0	0	182	3	66	460
0.0	-.23819E 07	0	0	1	7	182	3	66	461
7	2					182	3	66	462
0.2395E+07	0.0000E-01	0.2600E+07	0.1330E+00	0.2800E+07	0.1691E+00	182	3	66	463
0.3000E+07	0.1786E+00	0.3200E+07	0.1710E+00	0.3500E+07	0.1330E+00	182	3	66	464
0.4000E+07	0.7600E-01					182	3	66	465
						182	3	0	466
.74182E 05	.18039E 03	0	17	0	0	182	3	67	467
0.0	-.24674E 07	0	0	1	6	182	3	67	468
6	2					182	3	67	469
0.2481E+07	0.0000E-01	0.2600E+07	0.8075E-01	0.2800E+07	0.1330E+00	182	3	67	470
0.3000E+07	0.1425E+00	0.3500E+07	0.1178E+00	0.4000E+07	0.9500E-01	182	3	67	471
						182	3	0	472
.74182E 05	.18039E 03	0	18	0	0	182	3	68	473
0.0	-.25420E 07	0	0	1	5	182	3	68	474
5	2					182	3	68	475
0.2556E+07	0.0000E-01	0.2800E+07	0.1050E+00	0.3000E+07	0.1252E+00	182	3	68	476
0.3200E+07	0.1252E+00	0.4000E+07	0.8479E-01			182	3	68	477
						182	3	0	478
.74182E 05	.18039E 03	0	19	0	0	182	3	69	479
0.0	-.26146E 07	0	0	1	6	182	3	69	480
6	2					182	3	69	481
0.2629E+07	0.0000E-01	0.2800E+07	0.6864E-01	0.3000E+07	0.1090E+00	182	3	69	482
0.3200E+07	0.1211E+00	0.3400E+07	0.1195E+00	0.4000E+07	0.8479E-01	182	3	69	483
						182	3	0	484
.74182E 05	.18039E 03	0	20	0	0	182	3	70	485
0.0	-.26902E 07	0	0	1	6	182	3	70	486
6	2					182	3	70	487
0.2705E+07	0.0000E-01	0.2800E+07	0.5653E-01	0.3000E+07	0.1171E+00	182	3	70	488
0.3200E+07	0.1454E+00	0.3400E+07	0.1454E+00	0.4000E+07	0.1131E+00	182	3	70	489
						182	3	0	490
.74182E 05	.18039E 03	0	21	0	0	182	3	71	491
0.0	-.27677E 07	0	0	1	5	182	3	71	492
5	2					182	3	71	493
0.2783E+07	0.0000E-01	0.3000E+07	0.7268E-01	0.3200E+07	0.9528E-01	182	3	71	494
0.3400E+07	0.9528E-01	0.4000E+07	0.8075E-01			182	3	71	495
						182	3	0	496
.74182E 05	.18039E 03	0	22	0	0	182	3	72	497
0.0	-.28185E 07	0	0	1	4	182	3	72	498
4	2					182	3	72	499

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0,2834E+07 0,0000E-01 0,3000E+07 0,5653E-01 0.3200E+07 0,6460E-01 182 3 72   500
0.4000E+07 0,4845E-01                                              182 3 72   501
                                                                   182 3  0   502
,74182E 05 ,18039E 03          0          23          0          0 182 3 73   503
0.0        -,28662E 07         0           0          1          4 182 3 73   504
         4          2                                              182 3 73   505
0.2882E+07 0,0000E-01 0,3200E+07 0,6460E-01 0.3400E+07 0,6460E-01 182 3 73   506
0.4000E+07 0,4845E-01                                              182 3 73   507
                                                                   182 3  0   508
,74182E 05 ,18039E 03          0          24          0          0 182 3 74   509
0.0        -,29318E 07         0           0          1          4 182 3 74   510
         4          2                                              182 3 74   511
0,2948E+07 0,0000E-01 0,3200E+07 0,7268E-01 0.3400E+07 0,7268E-01 182 3 74   512
0.4000E+07 0,5653E-01                                              182 3 74   513
                                                                   182 3  0   514
,74182E 05 ,18039E 03          0          25          0          0 182 3 75   515
0.0        -,29786E 07         0           0          1          4 182 3 75   516
         4          2                                              182 3 75   517
0,2995E+07 0,0000E-01 0,3200E+07 0,6460E-01 0,3400E+07 0,6460E-01 182 3 75   518
0.4000E+07 0,4845E-01                                              182 3 75   519
                                                                   182 3  0   520
,74182E 05 ,18039E 03          0          26          0          0 182 3 76   521
0.0        -,30213E 07         0           0          1          4 182 3 76   522
         4          2                                              182 3 76   523
0.3038E+07 0,0000E-01 0,3300E+07 0,7268E-01 0,3500E+07 0,7268E-01 182 3 76   524
0.4000E+07 0,6056E-01                                              182 3 76   525
                                                                   182 3  0   526
,74182E 05 ,18039E 03          0          27          0          0 182 3 77   527
0.0        -,30622E 07         0           0          1          4 182 3 77   528
         4          2                                              182 3 77   529
0.3079E+07 0,0000E-01 0,3300E+07 0,5653E-01 0.3500E+07 0,5653E-01 182 3 77   530
0.4000E+07 0,4684E-01                                              182 3 77   531
                                                                   182 3  0   532
,74182E 05 ,18039E 03          0          99          0          0 182 3 91   533
0.0        -,31825E 07         0           0          1          9 182 3 91   534
         9          2                                              182 3 91   535
0.3200E+07 0,0000E-01 0,3300E+07 0.2000E-01 0.3400E+07 0,1600E+00 182 3 91   536
0.3500E+07 0,3200E+00 0,3600E+07 0,4800E+00 0.3700E+07 0,6200E+00 182 3 91   537
0,3800E+07 0,7400E+00 0,3900E+07 0.8500E+00 0.4000E+07 0,9600E+00 182 3 91   538
                                                                   182 3  0   539
,74182E 05 ,18039E 03          0          99          0          0 182 3102   540
0.0        0,0                 0           0          1         18 182 3102   541
        18          2                                              182 3102   542
0.1000E+06 0,1950E+00 0,1006E+06 0.1949E+00 0.1500E+06 0,1359E+00 182 3102   543
0.1750E 06 0.1159E 00 0,2000E+06 0.1009E+00 0.2500E+06 0.9490E-01 182 3102   544
0.3000E+06 0,9090E-01 0.4000E+06 0,8290E-01 0.5000E+06 0.7690E-01 182 3102   545
0.6000E+06 0,7590E-01 0.7000E+06 0,8090E-01 0.8000E+06 0.8190E-01 182 3102   546
0.9000E+06 0,8250E-01 0,1000E+07 0,8900E-01 0.1350E+07 0.9800E-01 182 3102   547
0.2000E+07 0,6100E-01 0,3000E+07 0.3500E-01 0.4000E+07 0,8000E-02 182 3102   548
                                                                   182 3  0   549
                                                                   182 0  0   550
,74182E 05 ,18039E 03          0           1          0          0 182 4  2   551
0.0        ,18039E 03          0           1          1         14 182 4  2   552
        14          2                                              182 4  2   553
,00000E 00 ,10000E-04          0           0          1          0 182 4  2   554
,33333E-04 ,00000E 00 ,00000E 00 ,00000E 00 ,00000E 00 ,00000E 00 182 4  2   555
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.00000E 00 .10000E 06          0          0          2          0 182 4  2  556
.40000E-01 .12000E-01 .00000E 00 .00000E 00 .00000E 00 .00000E 00 182 4  2  557
.00000E 00 .20000E 06          0          0          4          0 182 4  2  558
.11333E 00 .40000E-01 .14286E-02 .11111E-03 .00000E 00 .00000E 00 182 4  2  559
.00000E 00 .40000E 06          0          0          4          0 182 4  2  560
.29333E 00 .12000E 00 .17143E-01 .55556E-02 .00000E 00 .00000E 00 182 4  2  561
.00000E 00 .60000E 06          0          0          4          0 182 4  2  562
.37667E 00 .20000E 00 .54286E-01 .14444E-01 .00000E 00 .00000E 00 182 4  2  563
.00000E 00 .80000E 06          0          0          6          0 182 4  2  564
.44000E 00 .27400E 00 .97143E-01 .26667E-01 .90909E-03 .76923E-04 182 4  2  565
.00000E 00 .10000E 07          0          0          6          0 182 4  2  566
.48667E 00 .33000E 00 .14429E 00 .43889E-01 .36364E-02 .76923E-04 182 4  2  567
.00000E 00 .14000E 07          0          0          6          0 182 4  2  568
.57333E 00 .41600E 00 .23857E 00 .90000E-01 .14545E-01 .30769E-02 182 4  2  569
.00000E 00 .18000E 07          0          0          8          0 182 4  2  570
.64000E 00 .47600E 00 .29571E 00 .12556E 00 .30727E-01 .41154E-02 182 4  2  571
-.65867E-02-.24118E-02 .00000E 00 .00000E 00 .00000E 00 .00000E 00 182 4  2  572
.00000E 00 .22000E 07          0          0          8          0 182 4  2  573
.73667E 00 .55000E 00 .37143E 00 .19333E 00 .69091E-01 .23077E-01 182 4  2  574
.53333E-02 .86235E-03 .00000E 00 .00000E 00 .00000E 00 .00000E 00 182 4  2  575
0.0000E-01 0.2600E+07          0          0          8          0 182 4  2  576
0.7953E+00 0.6092E+00 0.4271E+00 0.2492E+00 0.1096E+00 0.4414E-01 182 4  2  577
0.1428E-01 0.4377E-02 0.0000E-01 0.0000E-01 0.0000E-01 0.0000E-01 182 4  2  578
0.0000E-01 0.3000E+07          0          0         10          0 182 4  2  579
0.8209E+00 0.6455E+00 0.4622E+00 0.2926E+00 0.1428E+00 0.6023E-01 182 4  2  580
0.2074E-01 0.6181E-02 0.1049E-02 0.5080E-03 0.0000E-01 0.0000E-01 182 4  2  581
0.0000E-01 0.3500E+07          0          0         12          0 182 4  2  582
0.8500E+00 0.6660E+00 0.4871E+00 0.3233E+00 0.1700E+00 0.7461E-01 182 4  2  583
0.2666E-01 0.6459E-02-0.1218E-06 0.1199E-07-0.2498E-06-0.1360E-06 182 4  2  584
0.0000E-01 0.4000E+07          0          0         12          0 182 4  2  585
0.8355E+00 0.6737E+00 0.4995E+00 0.3436E+00 0.1886E+00 0.9188E-01 182 4  2  586
0.3761E-01 0.1262E-01 0.3157E-02 0.2006E-02 0.1223E-02 0.5204E-03 182 4  2  587
                                                                  182 4  0  588
.74182E 05 .18039E 03          0          1          0          0 182 4 51  589
0.0        .18039E 03          0          1          1         15 182 4 51  590
                                                                  182 4 51  591
        15          2
.00000E 00 .10065E 06          0          0          0          0 182 4 51  592
.00000E 00 .00000E 00 .00000E 00 .00000E  0 . 0000E 00 .00000E 00 182 4 51  593
.00000E 00 .20000E 06          0          0          2          0 182 4 51  594
.33333E-02 .20000E-03 .00000E 00 .00000E 00 .00000E 00 .00000E 00 182 4 51  595
.00000E 00 .40000E 06          0          0          4          0 182 4 51  596
.13333E-01-.40000E-02 .14286E-02 .11111E-03 .00000E 00 .00000E 00 182 4 51  597
.00000E 00 .60000E 06          0          0          4          0 182 4 51  598
.36667E-01-.12000E-01 .28571E-02 .11111E-02 .00000E 00 .00000E 00 182 4 51  599
.00000E 00 .80000E 06          0          0          4          0 182 4 51  600
.36667E-01-.20000E-01 .57143E-02 .11111E-02 .00000E 00 .00000E 00 182 4 51  601
.00000E 00 .10000E 07          0          0          4          0 182 4 51  602
.15000E-01-.24200E-01 .71429E-02 .11111E-03 .00000E 00 .00000E 00 182 4 51  603
.00000E 00 .12000E 07          0          0          4          0 182 4 51  604
.66667E-02-.25000E-01 .11429E-01 .11111E-02 .00000E 00 .00000E 00 182 4 51  605
.00000E 00 .14000E 07          0          0          4          0 182 4 51  606
.11667E-01-.22000E-01 .15714E-01-.11111E-02 .00000E 00 .00000E 00 182 4 51  607
.00000E 00 .16000E 07          0          0          6          0 182 4 51  608
.33333E-01-.22000E-01 .22857E-01-.44444E-02 .18182E-02 .76923E-04 182 4 51  609
.00000E 00 .18000E 07          0          0          6          0 182 4 51  610
.56667E-01-.16000E-01 .30000E-01-.88889E-02-.22727E-02 .30769E-02 182 4 51  611
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.00000E 00	.20000E 07	0	0	6	0	182	4	51	612
.86667E-01	.20000E-02	.37143E-01	-.11111E-01	-.36364E-02	.76923E-02	182	4	51	613
.00000E 00	.25000E 07	0	0	6	0	182	4	51	614
.15833E 00	.24000E-01	.49143E-01	-.65333E-02	-.17091E-02	.23769E-02	182	4	51	615
.00000E 00	.30000E 07	0	0	8	0	182	4	51	616
.25667E 00	.62000E-01	.71429E-01	.12222E-01	.36364E-02	-.12308E-01	182	4	51	617
-.33333E-02	.47059E-02	.00000E 00	.00000E 00	.00000E 00	.00000E 00	182	4	51	618
.00000E 00	.35000E 07	0	0	8	0	182	4	51	619
.24000E 00	.66000E-01	.51429E-01	.32222E-01	.11364E-01	-.35385E-01	182	4	51	620
-.66667E-02	.94118E-02	.00000E 00	.00000E 00	.00000E 00	.00000E 00	182	4	51	621
.00000E 00	.40000E 07	0	0	10	0	182	4	51	622
.27567E 00	.47200E-01	.25143E-01	-.84778E-03	-.25909E-01	-.46462E-01	182	4	51	623
.41867E-02	.10118E-01	-.20947E-02	.17333E-02	.00000E 00	.00000E 00	182	4	51	624
						182	4	0	625
.74182E 05	.18039E 03	0	1	0	0	182	4	52	626
0.0	.18039E 03	0	1	1	9	182	4	52	627
9	2					182	4	52	628
.00000E 00	.33121E 06	0	0	1	0	182	4	52	629
.00000E 00	.00000E 00	.00000E 00	.00000E 00	.00000E 00	.00000E 00	182	4	52	630
.00000E 00	.50000E 06	0	0	2	0	182	4	52	631
.16667E-02	.10000E-03	.00000E 00	.00000E 00	.00000E 00	.00000E 00	182	4	52	632
.00000E 00	.10000E 07	0	0	2	0	182	4	52	633
.33333E-02	.20000E-03	.00000E 00	.00000E 00	.00000E 00	.00000E 00	182	4	52	634
.00000E 00	.15000E 07	0	0	4	0	182	4	52	635
.50000E-02	.10000E-02	.14286E-03	.55556E-04	.00000E 00	.00000E 00	182	4	52	636
.00000E 00	.20000E 07	0	0	4	0	182	4	52	637
.36667E-01	.20000E-02	.10000E-01	.44444E-02	.00000E 00	.00000E 00	182	4	52	638
.00000E 00	.25000E 07	0	0	4	0	182	4	52	639
.90000E-01	.10000E-01	.25714E-01	.11111E-01	.00000E 00	.00000E 00	182	4	52	640
.00000E 00	.30000E 07	0	0	4	0	182	4	52	641
.15500E 00	.20000E-01	.42857E-01	.17778E-01	.00000E 00	.00000E 00	182	4	52	642
.00000E 00	.35000E 07	0	0	4	0	182	4	52	643
.21667E 00	.33000E-01	.60000E-01	.27778E-01	.00000E 00	.00000E 00	182	4	52	644
.00000E 00	.40000E 07	0	0	4	0	182	4	52	645
.27667E 00	.45000E-01	.75714E-01	.37778E-01	.00000E 00	.00000E 00	182	4	52	646
						182	4	0	647
.74182E 05	.18039E 03	0	0	0	0	182	4	53	648
0.0	.18039E 03	1	1	0	0	182	4	53	649
						182	4	0	650
.74182E 05	.18039E 03	0	0	0	0	182	4	54	651
0.0	.18039E 03	1	1	0	0	182	4	54	652
						182	4	0	653
.74182E 05	.18039E 03	0	0	0	0	182	4	55	654
0.0	.18039E 03	1	1	0	0	182	4	55	655
						182	4	0	656
.74182E 05	.18039E 03	0	0	0	0	182	4	56	657
0.0	.18039E 03	1	1	0	0	182	4	56	658
						182	4	0	659
.74182E 05	.18039E 03	0	0	0	0	182	4	57	660
0.0	.18039E 03	1	1	0	0	182	4	57	661
						182	4	0	662
.74182E 05	.18039E 03	0	0	0	0	182	4	58	663
0.0	.18039E 03	1	1	0	0	182	4	58	664
						182	4	0	665
.74182E 05	.18039E 03	0	0	0	0	182	4	59	666
0.0	.18039E 03	1	1	0	0	182	4	59	667

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						182	4	0	668
.74182E 05	.18039E 03	0	0	0	0	182	4	60	669
0.0	.18039E 03	1	1	0	0	182	4	60	670
						182	4	0	671
.74182E 05	.18039E 03	0	0	0	0	182	4	61	672
0.0	.18039E 03	1	1	0	0	182	4	61	673
						182	4	0	674
.74182E 05	.18039E 03	0	0	0	0	182	4	62	675
0.0	.18039E 03	1	1	0	0	182	4	62	676
						182	4	0	677
.74182E 05	.18039E 03	0	0	0	0	182	4	63	678
0.0	.18039E 03	1	1	0	0	182	4	63	679
						182	4	0	680
.74182E 05	.18039E 03	0	0	0	0	182	4	64	681
0.0	.18039E 03	1	1	0	0	182	4	64	682
						182	4	0	683
.74182E 05	.18039E 03	0	0	0	0	182	4	65	684
0.0	.18039E 03	1	1	0	0	182	4	65	685
						182	4	0	686
.74182E 05	.18039E 03	0	0	0	0	182	4	66	687
0.0	.18039E 03	1	1	0	0	182	4	66	688
						182	4	0	689
.74182E 05	.18039E 03	0	0	0	0	182	4	67	690
0.0	.18039E 03	1	1	0	0	182	4	67	691
						182	4	0	692
.74182E 05	.18039E 03	0	0	0	0	182	4	68	693
0.0	.18039E 03	1	1	0	0	182	4	68	694
						182	4	0	695
.74182E 05	.18039E 03	0	0	0	0	182	4	69	696
0.0	.18039E 03	1	1	0	0	182	4	69	697
						182	4	0	698
.74182E 05	.18039E 03	0	0	0	0	182	4	70	699
0.0	.18039E 03	1	1	0	0	182	4	70	700
						182	4	0	701
.74182E 05	.18039E 03	0	0	0	0	182	4	71	702
0.0	.18039E 03	1	1	0	0	182	4	71	703
						182	4	0	704
.74182E 05	.18039E 03	0	0	0	0	182	4	72	705
0.0	.18039E 03	1	1	0	0	182	4	72	706
						182	4	0	707
.74182E 05	.18039E 03	0	0	0	0	182	4	73	708
0.0	.18039E 03	1	1	0	0	182	4	73	709
						182	4	0	710
.74182E 05	.18039E 03	0	0	0	0	182	4	74	711
0.0	.18039E 03	1	1	0	0	182	4	74	712
						182	4	0	713
.74182E 05	.18039E 03	0	0	0	0	182	4	75	714
0.0	.18039E 03	1	1	0	0	182	4	75	715
						182	4	0	716
.74182E 05	.18039E 03	0	0	0	0	182	4	76	717
0.0	.18039E 03	1	1	0	0	182	4	76	718
						182	4	0	719
.74182E 05	.18039E 03	0	0	0	0	182	4	77	720
0.0	.18039E 03	1	1	0	0	182	4	77	721
						182	4	0	722
.74182E 05	.18039E 03	0	0	0	0	182	4	91	723

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```
 0.0         .18039E 03         1            1            0            0 182 4 91   724
                                                                         182 4  0   725
                                                                         182 0  0   726
*EØF                                                                      -1 0  0   727

CCCC     W-184
.74184E 05 .18237E 03                                                    184 0  0     0
0.0          0.0            0            0            0            1 184 1451     1
0.0          0.0            0            0            0            0 184 1451     2
--------------------------------------------------------------------64 184 1451     3
W-184 EVALUATIØN, CØMPØNENTS FØR MASTER FILE, A, SMITH ET AL.,           184 1451     4
REFERENCE ANL/NDM-56(1981)                                               184 1451     5
                                                                         184 1451     6
--------------------------------------------------------------------     184 1451     7
                            1          451           71            1 184 1451     8
                            3            1          122            1 184 1451     9
                            3            2          117            1 184 1451    10
                            3            4           25            1 184 1451    11
                            3           51           13            1 184 1451    12
                            3           52           10            1 184 1451    13
                            3           53            6            1 184 1451    14
                            3           54            9            1 184 1451    15
                            3           55            9            1 184 1451    16
                            3           56            9            1 184 1451    17
                            3           57            8            1 184 1451    18
                            3           58            7            1 184 1451    19
                            3           59            7            1 184 1451    20
                            3           60            7            1 184 1451    21
                            3           61            6            1 184 1451    22
                            3           62            6            1 184 1451    23
                            3           63            7            1 184 1451    24
                            3           64            6            1 184 1451    25
                            3           65            6            1 184 1451    26
                            3           66            6            1 184 1451    27
                            3           67            6            1 184 1451    28
                            3           68            6            1 184 1451    29
                            3           69            6            1 184 1451    30
                            3           70            6            1 184 1451    31
                            3           71            5            1 184 1451    32
                            3           72            5            1 184 1451    33
                            3           73            5            1 184 1451    34
                            3           74            5            1 184 1451    35
                            3           75            5            1 184 1451    36
                            3           76            5            1 184 1451    37
                            3           77            5            1 184 1451    38
                            3           78            5            1 184 1451    39
                            3           91            6            1 184 1451    40
                            3          102            9            1 184 1451    41
                            4            2           37            1 184 1451    42
                            4           51           36            1 184 1451    43
                            4           52           21            1 184 1451    44
                            4           53            2            1 184 1451    45
                            4           54            2            1 184 1451    46
                            4           55            2            1 184 1451    47
                            4           56            2            1 184 1451    48
                            4           57            2            1 184 1451    49
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		4	58	2	1	184	1451		50
		4	59	2	1	184	1451		51
		4	60	2	1	184	1451		52
		4	61	2	1	184	1451		53
		4	62	2	1	184	1451		54
		4	63	2	1	184	1451		55
		4	64	2	1	184	1451		56
		4	65	2	1	184	1451		57
		4	66	5	1	184	1451		58
		4	67	5	1	184	1451		59
		4	68	2	1	184	1451		60
		4	69	2	1	184	1451		61
		4	70	2	1	184	1451		62
		4	71	2	1	184	1451		63
		4	72	2	1	184	1451		64
		4	73	2	1	184	1451		65
		4	74	2	1	184	1451		66
		4	75	2	1	184	1451		67
		4	76	2	1	184	1451		68
		4	77	2	1	184	1451		69
		4	78	2	1	184	1451		70
		4	91	2	1	184	1451		71
						184	1	0	72
						184	0	0	73
,74182E 05	,18039E 03	0	99	0	0	184	3	1	74
0.0	0,0	0	0	1	356	184	3	1	75
356	2					184	3	1	76
0.1000E+06	0.9610E+01	0,1092E+06	0.9146E+01	0.1113E+06	0.9083E+01	184	3	1	77
0.1116E+06	0,9076E+01	0,1133E+06	0.9035E+01	0.1153E+06	0,9034E+01	184	3	1	78
0.1173E+06	0,9011E+01	0,1193E+06	0.8971E+01	0.1213E+06	0,8935E+01	184	3	1	79
0,1234E+06	0,8906E+01	0,1250E+06	0.8891E+01	0.1254E+06	0,8887E+01	184	3	1	80
0.1274E+06	0.8868E+01	0,1294E+06	0.8837E+01	0.1324E+06	0,8780E+01	184	3	1	81
0.1344E+06	0.8763E+01	0,1354E+06	0.8749E+01	0.1374E+06	0,8732E+01	184	3	1	82
0.1394E+06	0,8736E+01	0,1414E+06	0.8761E+01	0.1434E+06	0.8720E+01	184	3	1	83
0.1454E+06	0,8652E+01	0,1475E+06	0.8607E+01	0.1495E+06	0.8578E+01	184	3	1	84
0.1500E+06	0,8576E+01	0,1505E+06	0.8574E+01	0.1527E+06	0.8539E+01	184	3	1	85
0,1549E+06	0.8485E+01	0.1572E+06	0.8461E+01	0.1605E+06	0.8429E+01	184	3	1	86
0.1616E+06	0,8368E+01	0,1636E+06	0.8353E+01	0.1661E+06	0.8399E+01	184	3	1	87
0.1683E+06	0,8449E+01	0.1715E+06	0.8469E+01	0.1735E+06	0.8491E+01	184	3	1	88
0,1750E+06	0,8501E+01	0.1755E+06	0.8505E+01	0.1775E+06	0.8475E+01	184	3	1	89
0.1795E+06	0,8447E+01	0,1815E+06	0.8402E+01	0.1835E+06	0.8387E+01	184	3	1	90
0.1855E+06	0.8342E+01	0,1875E+06	0.8290E+01	0.1896E+06	0.8233E+01	184	3	1	91
0.1916E+06	0.8209E+01	0,1936E+06	0.8155E+01	0.1956E+06	0.8083E+01	184	3	1	92
0.1976E+06	0.8035E+01	0.2000E+06	0.7970E+01	0.2006E+06	0,7954E+01	184	3	1	93
0.2016E+06	0,7938E+01	0,2036E+06	0.7892E+01	0,2056E+06	0.7863E+01	184	3	1	94
0.2086E+06	0,7827E+01	0.2096E+06	0.7799E+01	0.2116E+06	0.7802E+01	184	3	1	95
0.2136E+06	0,7811E+01	0,2156E+06	0.7839E+01	0.2186E+06	0,7875E+01	184	3	1	96
0,2196E+05	0,7911E+01	0.2216E+06	0.7949E+01	0.2236E+06	0,7958E+01	184	3	1	97
0,2266E+06	0,7927E+01	0,2276E+06	0.7934E+01	0.2296E+06	0.7940E+01	184	3	1	98
0.2316E+06	0,7915E+01	0,2336E+06	0.7915E+01	0.2366E+06	0.7866E+01	184	3	1	99
0.2376E+06	0,7864E+01	0,2396E+06	0.7824E+01	0.2416E+06	0.7776E+01	184	3	1	100
0.2436E+06	0,7738E+01	0,2456E+06	0.7727E+01	0.2476E+06	0.7690E+01	184	3	1	101
0.2496E+06	0,7662E+01	0,2500E+06	0.7654E+01	0.2516E+06	0.7624E+01	184	3	1	102
0.2537E+06	0,7561E+01	0,2557E+06	0.7518E+01	0.2577E+06	0.7482E+01	184	3	1	103
0.2597E+06	0,7475E+01	0,2617E+06	0.7482E+01	0.2637E+06	0.7500E+01	184	3	1	104
0,2657E+06	0,7479E+01	0,2677E+06	0.7471E+01	0.2697E+06	0.7463E+01	184	3	1	105

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0,2717E+06	0,7476E+01	0,2747E+06	0.7536E+01	0.2757E+06	0,7557E+01	184	3	1	106
0,2777E+06	0,7608E+01	0.2797E+06	0.7593E+01	0.2817E+06	0.7570E+01	184	3	1	107
0.2837E+06	0,7547E+01	0.2857E+06	0.7553E+01	0.2877E+06	0.7550E+01	184	3	1	108
0,2897E+06	0,7552E+01	0,2927E+06	0.7497E+01	0.2937E+06	0.7479E+01	184	3	1	109
0.2957E+06	0,7411E+01	0,2977E+06	0.7361E+01	0,2967E+06	0.7359E+01	184	3	1	110
0,3000E+06	0,7347E+01	0,3009E+06	0.7339E+01	0.3031E+06	0.7324E+01	184	3	1	111
0,3054E+06	0,7294E+01	0,3076E+06	0,7272E+01	0.3109E+06	0.7235E+01	184	3	1	112
0,3120E+06	0,7216E+01	0,3143E+06	0,7222E+01	0.3165E+06	0.7213E+01	184	3	1	113
0,3197E+06	0,7224E+01	0,3217E+06	0.7241E+01	0.3237E+06	0,7240E+01	184	3	1	114
0.3257E+06	0,7250E+01	0,3287E+06	0.7265E+01	0.3297E+06	0,7275E+01	184	3	1	115
0,3317E+06	0,7295E+01	0,3337E+06	0.7308E+01	0.3357E+06	0,7322E+01	184	3	1	116
0.3377E+06	0,7307E+01	0,3397E+06	0,7289E+01	0.3407E+06	0,7270E+01	184	3	1	117
0,3417E+06	0,7272E+01	0,3442E+06	0.7266E+01	0.3468E+06	0,7257E+01	184	3	1	118
0,3493E+06	0,7238E+01	0,3518E+06	0.7221E+01	0.3543E+06	0.7211E+01	184	3	1	119
0,3568E+06	0,7203E+01	0,3604E+06	0,7182E+01	0,3638E+06	0.7179E+01	184	3	1	120
0,3658E+06	0,7161E+01	0,3659E+06	0,7161E+01	0.3678E+06	0.7161E+01	184	3	1	121
0,3698E+06	0,7181E+01	0,3718E+06	0,7183E+01	0.3738E+06	0,7167E+01	184	3	1	122
0.3768E+06	0,7104E+01	0,3778E+06	0,7111E+01	0.3798E+06	0,7083E+01	184	3	1	123
0,3818E+06	0,7075E+01	0,3838E+06	0,7091E+01	0.3858E+06	0,7079E+01	184	3	1	124
0.3878E+06	0,7059E+01	0,3898E+06	0,7058E+01	0.3918E+06	0.7056E+01	184	3	1	125
0,3948E+06	0,7107E+01	0,3958E+06	0,7144E+01	0.3978E+06	0,7182E+01	184	3	1	126
0,3998E+06	0,7192E+01	0,4000E+06	0,7191E+01	0.4018E+06	0.7179E+01	184	3	1	127
0,4038E+06	0,7166E+01	0,4058E+06	0,7167E+01	0.4078E+06	0.7158E+01	184	3	1	128
0,4098E+06	0.7130E+01	0,4128E+06	0,7115E+01	0.4138E+06	0,7087E+01	184	3	1	129
0,4158E+06	0,7070E+01	0,4178E+06	0,7036E+01	0.4198E+06	0.7027E+01	184	3	1	130
0,4218E+06	0,7012E+01	0,4238E+06	0,6993E+01	0.4258E+06	0,6969E+01	184	3	1	131
0,4278E+06	0,6987E+01	0,4308E+06	0.7009E+01	0.4318E+06	0.7008E+01	184	3	1	132
0,4338E+06	0,6997E+01	0,4368E+06	0.6967E+01	0.4387E+06	0.6955E+01	184	3	1	133
0,4407E+06	0,6982E+01	0,4426E+06	0.7021E+01	0.4446E+06	0.7053E+01	184	3	1	134
0.4465E+06	0,7081E+01	0.4485E+06	0.7056E+01	0.4512E+06	0.7060E+01	184	3	1	135
0.4530E+06	0,7057E+01	0,4548E+06	0.7053E+01	0.4566E+06	0,7062E+01	184	3	1	136
0,4575E+06	0,7087E+01	0,4594E+06	0.7109E+01	0.4612E+06	0,7111E+01	184	3	1	137
0,4630E+06	0,7087E+01	0,4648E+06	0,7061E+01	0,4667E+06	0,7057E+01	184	3	1	138
0.4685E+06	0,7058E+01	0,4693E+06	0.7058E+01	0,4685E+06	0.7064E+01	184	3	1	139
0.4713E+06	0,7039E+01	0,4733E+06	0,7026E+01	0.4762E+06	0,7006E+01	184	3	1	140
0.4781E+06	0,7005E+01	0,4799E+06	0.6994E+01	0.4817E+06	0,6994E+01	184	3	1	141
0.4835E+06	0,7003E+01	0,4854E+06	0,7015E+01	0.4881E+06	0.7006E+01	184	3	1	142
0,4899E+06	0,7007E+01	0,4916E+06	0.7005E+01	0.4932E+06	0,6994E+01	184	3	1	143
0,4949E+06	0,6992E+01	0.4958E+06	0.6993E+01	0.4976E+06	0,6970E+01	184	3	1	144
0.4995E+06	0,6946E+01	0.5000E+06	0.6939E+01	0.5013E+06	0.6919E+01	184	3	1	145
0.5040E+06	0,6903E+01	0,5059E+06	0.6873E+01	0.5077E+06	0,6821E+01	184	3	1	146
0.5085E+06	0,6812E+01	0.5104E+06	0,6792E+01	0.5085E+06	0.6816E+01	184	3	1	147
0.5124E+06	0,6767E+01	0,5144E+06	0.6761E+01	0.5171E+06	0,6761E+01	184	3	1	148
0.5189E+06	0,6752E+01	0.5208E+06	0.6770E+01	0.5226E+06	0.6769E+01	184	3	1	149
0,5235E+06	0,6751E+01	0,5254E+06	0.6733E+01	0.5263E+06	0.6737E+01	184	3	1	150
0,5283E+06	0,6750E+01	0.5303E+06	0.6728E+01	0.5323E+06	0.6742E+01	184	3	1	151
0.5343E+06	0,6747E+01	0,5353E+06	0.6722E+01	0.5375E+06	0,6723E+01	184	3	1	152
0.5416E+06	0,6735E+01	0,5436E+06	0.6708E+01	0.5456E+06	0,6684E+01	184	3	1	153
0.5485E+06	0,6691E+01	0,5504E+06	0.6690E+01	0.5522E+06	0.6703E+01	184	3	1	154
0.5540E+06	0,6711E+01	0,5559E+06	0.6691E+01	0.5577E+06	0.6696E+01	184	3	1	155
0.5585E+06	0.6690E+01	0,5604E+06	0.6677E+01	0.5585E+06	0.6689E+01	184	3	1	156
0.5622E+06	0,6676E+01	0,5640E+06	0.6656E+01	0.5658E+06	0,6666E+01	184	3	1	157
0.5676E+06	0,6666E+01	0,5695E+06	0.6670E+01	0.5713E+06	0.6681E+01	184	3	1	158
0.5731E+06	0,6695E+01	0,5759E+06	0,6655E+01	0.5777E+06	0.6665E+01	184	3	1	159
0.5785E+06	0,6658E+01	0.5794E+06	0,6656E+01	0.5814E+06	0.6657E+01	184	3	1	160
0.5834E+06	0,6629E+01	0,5854E+06	0,6617E+01	0.5874E+06	0,6597E+01	184	3	1	161

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0.5884E+06	0.6578E+01	0.5907E+06	0.6544E+01	0.5929E+06	0.6525E+01	184	3	1	162
0.5951E+06	0.6531E+01	0.5974E+06	0.6538E+01	0.6000E+06	0.6514E+01	184	3	1	163
0.6007E+06	0.6507E+01	0.6029E+06	0.6491E+01	0.6051E+06	0.6541E+01	184	3	1	164
0.6073E+06	0.6549E+01	0.6095E+06	0.6562E+01	0.6115E+06	0.6606E+01	184	3	1	165
0.6135E+06	0.6596E+01	0.6155E+06	0.6559E+01	0.6165E+06	0.6558E+01	184	3	1	166
0.6198E+06	0.6623E+01	0.6218E+06	0.6629E+01	0.6248E+06	0.6635E+01	184	3	1	167
0.6268E+06	0.6653E+01	0.6288E+06	0.6677E+01	0.6308E+06	0.6667E+01	184	3	1	168
0.6328E+06	0.6573E+01	0.6348E+06	0.6682E+01	0.6378E+06	0.6711E+01	184	3	1	169
0.6386E+06	0.6699E+01	0.6395E+06	0.6693E+01	0.6405E+06	0.6702E+01	184	3	1	170
0.6415E+06	0.6706E+01	0.6425E+06	0.6722E+01	0.6435E+06	0.6705E+01	184	3	1	171
0.6445E+06	0.6669E+01	0.6455E+06	0.6661E+01	0.6465E+06	0.6635E+01	184	3	1	172
0.6475E+06	0.6642E+01	0.6485E+06	0.6668E+01	0.7000E+06	0.6632E+01	184	3	1	173
0.7524E+06	0.6643E+01	0.8000E+06	0.6653E+01	0.9000E+06	0.6647E+01	184	3	1	174
0.9080E+06	0.6650E+01	0.1000E+07	0.6680E+01	0.1005E+07	0.6681E+01	184	3	1	175
0.1100E+07	0.6700E+01	0.1131E+07	0.6706E+01	0.1200E+07	0.6720E+01	184	3	1	176
0.1287E+07	0.6781E+01	0.1300E+07	0.6790E+01	0.1383E+07	0.6848E+01	184	3	1	177
0.1400E+07	0.6860E+01	0.1443E+07	0.6879E+01	0.1500E+07	0.6905E+01	184	3	1	178
0.1546E+07	0.6926E+01	0.1600E+07	0.6950E+01	0.1622E+07	0.6958E+01	184	3	1	179
0.1676E+07	0.6977E+01	0.1700E+07	0.6985E+01	0.1766E+07	0.7008E+01	184	3	1	180
0.1800E+07	0.7020E+01	0.1900E+07	0.7060E+01	0.1921E+07	0.7068E+01	184	3	1	181
0.2000E+07	0.7100E+01	0.2019E+07	0.7105E+01	0.2100E+07	0.7125E+01	184	3	1	182
0.2116E+07	0.7129E+01	0.2200E+07	0.7150E+01	0.2209E+07	0.7150E+01	184	3	1	183
0.2300E+07	0.7150E+01	0.2324E+07	0.7150E+01	0.2400E+07	0.7150E+01	184	3	1	184
0.2453E+07	0.7139E+01	0.2500E+07	0.7130E+01	0.2533E+07	0.7123E+01	184	3	1	185
0.2594E+07	0.7111E+01	0.2600E+07	0.7110E+01	0.2652E+07	0.7094E+01	184	3	1	186
0.2677E+07	0.7087E+01	0.2749E+07	0.7065E+01	0.2800E+07	0.7050E+01	184	3	1	187
0.2826E+07	0.7041E+01	0.2881E+07	0.7022E+01	0.2933E+07	0.7003E+01	184	3	1	188
0.2982E+07	0.6986E+01	0.3000E+07	0.6960E+01	0.3200E+07	0.6904E+01	184	3	1	189
0.3300E+07	0.6866E+01	0.3400E+07	0.6828E+01	0.3500E+07	0.6790E+01	184	3	1	190
0.3600E+07	0.6738E+01	0.3800E+07	0.6634E+01	0.4000E+07	0.6530E+01	184	3	1	191
0.4500E+07	0.6220E+01	0.5000E+07	0.5930E+01	0.6000E+07	0.5500E+01	184	3	1	192
0.7000E+07	0.5200E+01	0.8000E+07	0.5050E+01	0.9000E+07	0.5010E+01	184	3	1	193
0.1000E+08	0.5110E+01	0.1200E+08	0.5300E+01	0.1400E+08	0.5550E+01	184	3	1	194
0.1500E+08	0.5650E+01	0.1600E+08	0.5750E+01	0.0000E-01	0.0000E-01	184	3	1	195
						184	3	0	196
.74184E 05	.18237E 03	0	99	0	0	184	3	2	197
0.0	0.0	0	0	1	342	184	3	2	198
342	2					184	3	2	199
0.1000E+06	0.9400E+01	0.1092E+06	0.8944E+01	0.1113E+06	0.8883E+01	184	3	2	200
0.1116E+06	0.8676E+01	0.1133E+06	0.8806E+01	0.1153E+06	0.8771E+01	184	3	2	201
0.1173E+06	0.8714E+01	0.1193E+06	0.8640E+01	0.1213E+06	0.8570E+01	184	3	2	202
0.1234E+06	0.8505E+01	0.1250E+06	0.8463E+01	0.1254E+06	0.8456E+01	184	3	2	203
0.1274E+06	0.8419E+01	0.1294E+06	0.8371E+01	0.1324E+06	0.8288E+01	184	3	2	204
0.1344E+06	0.8254E+01	0.1354E+06	0.8231E+01	0.1374E+06	0.8196E+01	184	3	2	205
0.1394E+06	0.8183E+01	0.1414E+06	0.8191E+01	0.1434E+06	0.8132E+01	184	3	2	206
0.1454E+06	0.8047E+01	0.1475E+06	0.7984E+01	0.1495E+06	0.7937E+01	184	3	2	207
0.1500E+06	0.7931E+01	0.1505E+06	0.7927E+01	0.1527E+06	0.7886E+01	184	3	2	208
0.1549E+06	0.7825E+01	0.1572E+06	0.7794E+01	0.1605E+06	0.7752E+01	184	3	2	209
0.1616E+06	0.7687E+01	0.1638E+06	0.7665E+01	0.1661E+06	0.7704E+01	184	3	2	210
0.1683E+06	0.7748E+01	0.1715E+06	0.7758E+01	0.1735E+06	0.7774E+01	184	3	2	211
0.1750E+06	0.7779E+01	0.1755E+06	0.7761E+01	0.1775E+06	0.7743E+01	184	3	2	212
0.1795E+06	0.7707E+01	0.1815E+06	0.7654E+01	0.1835E+06	0.7631E+01	184	3	2	213
0.1855E+06	0.7578E+01	0.1875E+06	0.7517E+01	0.1896E+06	0.7452E+01	184	3	2	214
0.1916E+06	0.7420E+01	0.1936E+06	0.7356E+01	0.1956E+06	0.7278E+01	184	3	2	215
0.1976E+06	0.7222E+01	0.2000E+06	0.7147E+01	0.2006E+06	0.7129E+01	184	3	2	216
0.2016E+06	0.7109E+01	0.2036E+06	0.7056E+01	0.2056E+06	0.7019E+01	184	3	2	217

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0.2086E+06	0.6972E+01	0.2096E+06	0.6940E+01	0.2116E+06	0.6936E+01	184	3	2	218
0.2136E+06	0.6937E+01	0.2156E+06	0.6956E+01	0.2186E+06	0.6982E+01	184	3	2	219
0.2196E+06	0.7015E+01	0.2216E+06	0.7045E+01	0.2236E+06	0.7047E+01	184	3	2	220
0.2266E+06	0.7005E+01	0.2276E+06	0.7008E+01	0.2296E+06	0.7006E+01	184	3	2	221
0.2316E+06	0.6974E+01	0.2336E+06	0.6969E+01	0.2366E+06	0.6906E+01	184	3	2	222
0.2376E+06	0.6900E+01	0.2396E+06	0.6853E+01	0.2416E+06	0.6797E+01	184	3	2	223
0.2436E+06	0.6752E+01	0.2456E+06	0.6733E+01	0.2476E+06	0.6589E+01	184	3	2	224
0.2496E+06	0.6653E+01	0.2500E+06	0.6644E+01	0.2516E+06	0.6610E+01	184	3	2	225
0.2537E+06	0.6541E+01	0.2557E+06	0.6493E+01	0.2577E+06	0.6452E+01	184	3	2	226
0.2597E+06	0.6440E+01	0.2617E+06	0.6441E+01	0.2637E+06	0.6454E+01	184	3	2	227
0.2657E+06	0.6428E+01	0.2677E+06	0.6415E+01	0.2697E+06	0.6401E+01	184	3	2	228
0.2717E+06	0.6409E+01	0.2747E+06	0.6461E+01	0.2757E+06	0.6480E+01	184	3	2	229
0.2777E+06	0.6525E+01	0.2797E+06	0.6505E+01	0.2817E+06	0.6477E+01	184	3	2	230
0.2837E+06	0.6449E+01	0.2857E+06	0.6449E+01	0.2877E+06	0.6441E+01	184	3	2	231
0.2897E+06	0.6438E+01	0.2927E+06	0.6375E+01	0.2937E+06	0.6355E+01	184	3	2	232
0.2957E+06	0.6281E+01	0.2977E+06	0.6226E+01	0.2987E+06	0.6221E+01	184	3	2	233
0.3000E+06	0.6206E+01	0.3009E+06	0.6196E+01	0.3031E+06	0.6176E+01	184	3	2	234
0.3054E+06	0.6141E+01	0.3076E+06	0.6114E+01	0.3109E+06	0.6070E+01	184	3	2	235
0.3120E+06	0.6049E+01	0.3143E+06	0.6050E+01	0.3165E+06	0.6036E+01	184	3	2	236
0.3197E+06	0.6040E+01	0.3217E+06	0.6052E+01	0.3237E+06	0.6047E+01	184	3	2	237
0.3257E+06	0.6052E+01	0.3267E+06	0.6064E+01	0.3297E+06	0.6069E+01	184	3	2	238
0.3317E+06	0.6084E+01	0.3337E+06	0.6093E+01	0.3357E+06	0.6102E+01	184	3	2	239
0.3377E+06	0.6083E+01	0.3397E+06	0.6061E+01	0.3407E+06	0.6039E+01	184	3	2	240
0.3417E+06	0.6039E+01	0.3442E+06	0.6030E+01	0.3468E+06	0.6013E+01	184	3	2	241
0.3493E+06	0.5989E+01	0.3518E+06	0.5966E+01	0.3543E+06	0.5951E+01	184	3	2	242
0.3568E+06	0.5937E+01	0.3604E+06	0.5908E+01	0.3638E+06	0.5898E+01	184	3	2	243
0.3658E+06	0.5875E+01	0.3659E+06	0.5875E+01	0.3678E+06	0.5869E+01	184	3	2	244
0.3698E+06	0.5684E+01	0.3718E+06	0.5880E+01	0.3738E+06	0.5858E+01	184	3	2	245
0.3768E+06	0.5786E+01	0.3778E+06	0.5790E+01	0.3798E+06	0.5756E+01	184	3	2	246
0.3818E+06	0.5742E+01	0.3838E+06	0.5753E+01	0.3858E+06	0.5735E+01	184	3	2	247
0.3878E+06	0.5709E+01	0.3898E+06	0.5702E+01	0.3918E+06	0.5694E+01	184	3	2	248
0.3948E+06	0.5736E+01	0.3958E+06	0.5770E+01	0.3978E+06	0.5802E+01	184	3	2	249
0.3998E+06	0.5807E+01	0.4000E+06	0.5805E+01	0.4018E+06	0.5789E+01	184	3	2	250
0.4038E+06	0.5773E+01	0.4058E+06	0.5770E+01	0.4078E+06	0.5757E+01	184	3	2	251
0.4098E+06	0.5725E+01	0.4128E+06	0.5704E+01	0.4138E+06	0.5674E+01	184	3	2	252
0.4158E+06	0.5653E+01	0.4178E+06	0.5617E+01	0.4198E+06	0.5602E+01	184	3	2	253
0.4218E+06	0.5583E+01	0.4238E+06	0.5560E+01	0.4258E+06	0.5532E+01	184	3	2	254
0.4278E+06	0.5546E+01	0.4308E+06	0.5562E+01	0.4318E+06	0.5559E+01	184	3	2	255
0.4338E+06	0.5544E+01	0.4368E+06	0.5509E+01	0.4387E+06	0.5493E+01	184	3	2	256
0.4407E+06	0.5516E+01	0.4426E+06	0.5551E+01	0.4446E+06	0.5579E+01	184	3	2	257
0.4465E+06	0.5603E+01	0.4485E+06	0.5574E+01	0.4512E+06	0.5573E+01	184	3	2	258
0.4530E+06	0.5567E+01	0.4548E+06	0.5559E+01	0.4566E+06	0.5564E+01	184	3	2	259
0.4575E+06	0.5588E+01	0.4594E+06	0.5606E+01	0.4612E+06	0.5604E+01	184	3	2	260
0.4630E+06	0.5577E+01	0.4648E+06	0.5547E+01	0.4667E+06	0.5540E+01	184	3	2	261
0.4693E+06	0.5535E+01	0.4685E+06	0.5543E+01	0.4713E+06	0.5513E+01	184	3	2	262
0.4733E+06	0.5496E+01	0.4762E+06	0.5470E+01	0.4781E+06	0.5465E+01	184	3	2	263
0.4799E+06	0.5451E+01	0.4817E+06	0.5447E+01	0.4835E+06	0.5453E+01	184	3	2	264
0.4854E+06	0.5461E+01	0.4881E+06	0.5446E+01	0.4899E+06	0.5444E+01	184	3	2	265
0.4916E+06	0.5439E+01	0.4932E+06	0.5424E+01	0.4949E+06	0.5419E+01	184	3	2	266
0.4958E+06	0.5418E+01	0.4976E+06	0.5392E+01	0.4995E+06	0.5364E+01	184	3	2	267
0.5000E+06	0.5355E+01	0.5013E+06	0.5334E+01	0.5040E+06	0.5313E+01	184	3	2	268
0.5059E+06	0.5280E+01	0.5077E+06	0.5225E+01	0.5104E+06	0.5191E+01	184	3	2	269
0.5085E+06	0.5218E+01	0.5124E+06	0.5162E+01	0.5144E+06	0.5153E+01	184	3	2	270
0.5171E+06	0.5148E+01	0.5189E+06	0.5136E+01	0.5208E+06	0.5151E+01	184	3	2	271
0.5226E+06	0.5147E+01	0.5235E+06	0.5127E+01	0.5254E+06	0.5106E+01	184	3	2	272
0.5263E+06	0.5108E+01	0.5283E+06	0.5118E+01	0.5303E+06	0.5092E+01	184	3	2	273

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0.5323E+06	0.5103E+01	0.5343E+06	0.5104E+01	0.5353E+06	0.5078E+01	184	3	2	274
0.5375E+06	0.5075E+01	0.5416E+06	0.5080E+01	0.5436E+06	0.5049E+01	184	3	2	275
0.5456E+06	0.5022E+01	0.5485E+06	0.5024E+01	0.5504E+06	0.5019E+01	184	3	2	276
0.5522E+06	0.5029E+01	0.5540E+06	0.5034E+01	0.5559E+06	0.5011E+01	184	3	2	277
0.5577E+06	0.5013E+01	0.5604E+06	0.4989E+01	0.5585E+06	0.5004E+01	184	3	2	278
0.5622E+06	0.4985E+01	0.5640E+06	0.4962E+01	0.5658E+06	0.4969E+01	184	3	2	279
0.5676E+06	0.4965E+01	0.5695E+06	0.4966E+01	0.5713E+06	0.4974E+01	184	3	2	280
0.5731E+06	0.4985E+01	0.5759E+06	0.4940E+01	0.5777E+06	0.4947E+01	184	3	2	281
0.5785E+06	0.4938E+01	0.5794E+06	0.4937E+01	0.5814E+06	0.4932F+01	184	3	2	282
0.5834E+06	0.4901E+01	0.5854E+06	0.4885E+01	0.5874E+06	0.4862E+01	184	3	2	283
0.5884E+06	0.4841E+01	0.5907E+06	0.4803E+01	0.5929E+06	0.4780E+01	184	3	2	284
0.5951E+06	0.4783E+01	0.5974E+06	0.4786E+01	0.6000E+06	0.4757E+01	184	3	2	285
0.6007E+06	0.4749E+01	0.6029E+06	0.4730E+01	0.6051E+06	0.4777E+01	184	3	2	286
0.6073E+06	0.4783E+01	0.6095E+06	0.4813E+01	0.6115E+06	0.4834E+01	184	3	2	287
0.6135E+06	0.4821E+01	0.6155E+06	0.4782E+01	0.6165E+06	0.4780E+01	184	3	2	288
0.6196E+06	0.4840E+01	0.6218E+06	0.4844E+01	0.6248E+06	0.4846E+01	184	3	2	289
0.6256E+06	0.4861E+01	0.6288E+06	0.4863E+01	0.6308E+06	0.4870E+01	184	3	2	290
0.6328E+06	0.4873E+01	0.6348E+06	0.4850E+01	0.6378E+06	0.4905E+01	184	3	2	291
0.6366E+06	0.4892E+01	0.6395E+06	0.4885E+01	0.6405E+06	0.4892E+01	184	3	2	292
0.6415E+06	0.4895E+01	0.6425E+06	0.4910E+01	0.6435E+06	0.4891E+01	184	3	2	293
0.6445E+06	0.4854E+01	0.6455E+06	0.4845E+01	0.6465E+06	0.4818E+01	184	3	2	294
0.6475E+06	0.4823E+01	0.6485E+06	0.4868E+01	0.7000E+06	0.4745E+01	184	3	2	295
0.7524E+06	0.4707E+01	0.8000E+06	0.4670E+01	0.9000E+06	0.4600E+01	184	3	2	296
0.9080E+06	0.4602E+01	0.1000E+07	0.4422E+01	0.1005E+07	0.4421E+01	184	3	2	297
0.1100E+07	0.4259E+01	0.1131E+07	0.4240E+01	0.1200E+07	0.4006E+01	184	3	2	298
0.1287E+07	0.3968E+01	0.1300E+07	0.3946E+01	0.1383E+07	0.3903E+01	184	3	2	299
0.1400E+07	0.3844E+01	0.1443E+07	0.3850E+01	0.1500E+07	0.3824E+01	184	3	2	300
0.1546E+07	0.3849E+01	0.1600E+07	0.3852E+01	0.1622E+07	0.3868E+01	184	3	2	301
0.1676E+07	0.3879E+01	0.1700E+07	0.3870E+01	0.1766E+07	0.3870E+01	184	3	2	302
0.1800E+07	0.3790E+01	0.1900E+07	0.3830E+01	0.1921E+07	0.3841E+01	184	3	2	303
0.2000E+07	0.3819E+01	0.2019E+07	0.3838E+01	0.2100E+07	0.3830E+01	184	3	2	304
0.2116E+07	0.3839E+01	0.2200E+07	0.3782E+01	0.2209E+07	0.3787E+01	184	3	2	305
0.2300E+07	0.3729E+01	0.2324E+07	0.3732E+01	0.2400E+07	0.3664E+01	184	3	2	306
0.2453E+07	0.3696E+01	0.2500E+07	0.3692E+01	0.2533E+07	0.3691E+01	184	3	2	307
0.2594E+07	0.3644E+01	0.2600E+07	0.3637E+01	0.2652E+07	0.3677E+01	184	3	2	308
0.2677E+07	0.3682E+01	0.2749E+07	0.3657E+01	0.2800E+07	0.3623E+01	184	3	2	309
0.2826E+07	0.3654E+01	0.2881E+07	0.3695E+01	0.2933E+07	0.3702E+01	184	3	2	310
0.2982E+07	0.3666E+01	0.3000E+07	0.3646E+01	0.3200E+07	0.3668E+01	184	3	2	311
0.3300E+07	0.3674E+01	0.3400E+07	0.3656E+01	0.3500E+07	0.3640E+01	184	3	2	312
0.3600E+07	0.3588E+01	0.3800E+07	0.3550E+01	0.4000E+07	0.3553E+01	184	3	2	313
						184	3	0	314
.74164E 05	.16237E 03	0	99	0	0	184	3	4	315
0.0	-.11100E 06	0	0	1	65	184	3	4	316
65	2					184	3	4	317
0.1116E+06	0.0000E-01	0.1250E+06	0.2400E+00	0.1500E+06	0.4800E+00	184	3	4	318
0.2000E+06	0.7200E+00	0.2500E+06	0.9200E+00	0.3000E+06	0.1060E+01	184	3	4	319
0.3659E+06	0.1205E+01	0.4000E+06	0.1305E+01	0.5000E+06	0.1505E+01	184	3	4	320
0.6000E+06	0.1680E+01	0.7000E+06	0.1810E+01	0.7524E+06	0.1857E+01	184	3	4	321
0.8000E+06	0.1903E+01	0.9000E+06	0.1966E+01	0.9080E+06	0.1967F+01	184	3	4	322
0.1000E+07	0.2178E+01	0.1005E+07	0.2160E+01	0.1100E+07	0.2365E+01	184	3	4	323
0.1131E+07	0.2392E+01	0.1200E+07	0.2642E+01	0.1287E+07	0.2745E+01	184	3	4	324
0.1300E+07	0.2775E+01	0.1383E+07	0.2881E+01	0.1400E+07	0.2953E+01	184	3	4	325
0.1443E+07	0.2968E+01	0.1500E+07	0.3022E+01	0.1546E+07	0.3020E+01	184	3	4	326
0.1600E+07	0.3043E+01	0.1622E+07	0.3036E+01	0.1676E+07	0.3046E+01	184	3	4	327
0.1700E+07	0.3064E+01	0.1766E+07	0.3090E+01	0.1800E+07	0.3183E+01	184	3	4	328
0.1900E+07	0.3187E+01	0.1921E+07	0.3165E+01	0.2000E+07	0.3242E+01	184	3	4	329

APPENDIX: EXPERIMENTAL EVALUATED DATA SETS (Contd.)

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```
0.2019E+07 0.3228E+01 0.2100E+07 0.3258E+01 0.2116E+07 0.3253E+01
0.2200E+07 0.3332E+01 0.2209E+07 0.3327E+01 0.2300E+07 0.3387E+01 184 3  4  330
0.2324E+07 0.3384E+01 0.2400E+07 0.3454E+01 0.2453E+07 0.3411E+01 184 3  4  331
0.2500E+07 0.3407E+01 0.2533E+07 0.3402E+01 0.2594E+07 0.3438E+01 184 3  4  332
0.2600E+07 0.3444E+01 0.2652E+07 0.3389E+01 0.2677E+07 0.3377E+01 184 3  4  333
0.2749E+07 0.3381E+01 0.2800E+07 0.3401E+01 0.2826E+07 0.3362E+01 184 3  4  334
0.2881E+07 0.3303E+01 0.2933E+07 0.3277E+01 0.2982E+07 0.3297E+01 184 3  4  335
0.3000E+07 0.3312E+01 0.3200E+07 0.3217E+01 0.3300E+07 0.3174E+01 184 3  4  336
0.3400E+07 0.3154E+01 0.3500E+07 0.3135E+01 0.3600E+07 0.3137E+01 184 3  4  337
0.3800E+07 0.3074E+01 0.4000E+07 0.2971E+01 0.0000E-01 0.0000E-01 184 3  4  338
                                                                  184 3  4  339
.74184E 05 .18237E 03          0          0                       184 3  0  340
0.0       -.11100E 06          0          1          0          0 184 3 51  341
        30          2          0          0          1         30 184 3 51  342
0.1116E+06 0.0000E-01 0.1250E+06 0.2400E+00                       184 3 51  343
0.2000E+06 0.7200E+00 0.2500E+06 0.9200E+00 0.1500E+06 0.4800E+00 184 3 51  344
0.4000E+06 0.1260E+01 0.5000E+06 0.1415E+01 0.3000E+06 0.1060E+01 184 3 51  345
0.7000E+06 0.1600E+01 0.8000E+06 0.1640E+01 0.6000E+06 0.1530E+01 184 3 51  346
0.1000E+07 0.1630E+01 0.1100E+07 0.1550E+01 0.9000E+06 0.1650E+01 184 3 51  347
0.1300E+07 0.1360E+01 0.1400E+07 0.1280E+01 0.1200E+07 0.1460E+01 184 3 51  348
0.1800E+07 0.1000E+01 0.2000E+07 0.8750E+00 0.1600E+07 0.1128E+01 184 3 51  349
0.2400E+07 0.6780E+00 0.2600E+07 0.5950E+00 0.2200E+07 0.7700E+00 184 3 51  350
0.3000E+07 0.4750E+00 0.3200E+07 0.4300E+00 0.2800E+07 0.5250E+00 184 3 51  351
0.3600E+07 0.3700E+00 0.3800E+07 0.3500E+00 0.3400E+07 0.3950E+00 184 3 51  352
                                            0.4000E+07 0.3350E+00 184 3 51  353
.74184E 05 .18237E 03          0          0                       184 3  0  354
0.0       -.36390E 06          0          2          0          0 184 3 52  355
        19          2          0          0          1         19 184 3 52  356
0.3659E+06 0.0000E-01 0.4000E+06 0.2500E-01                       184 3 52  357
0.6000E+06 0.1500E+00 0.7000E+06 0.2100E+00 0.5000E+06 0.9000E-01 184 3 52  358
0.9000E+06 0.3050E+00 0.1000E+07 0.3300E+00 0.8000E+06 0.2600E+00 184 3 52  359
0.1200E+07 0.3500E+00 0.1300E+07 0.3420E+00 0.1100E+07 0.3450E+00 184 3 52  360
0.1600E+07 0.3000E+00 0.2000E+07 0.2300E+00 0.1400E+07 0.3330E+00 184 3 52  361
0.2800E+07 0.9000E-01 0.3000E+07 0.7000E-01 0.2400E+07 0.1450E+00 184 3 52  362
0.4000E+07 0.2200E-01 0.0000E-01 0.0000E-01 0.3500E+07 0.4000E-01 184 3 52  363
                                            0.0000E-01 0.0000E-01 184 3 52  364
.74184E 05 .18237E 03          0          0                       184 3  0  365
0.0       -.74820E 06          0          3          0          0 184 3 53  366
         7          2          0          0          1          7 184 3 53  367
0.7524E+06 0.0000E-01 0.1000E+07 0.1800E-01                       184 3 53  368
0.1800E+07 0.3000E-01 0.2200E+07 0.3000E-01 0.1400E+07 0.2500E-01 184 3 53  369
0.4000E+07 0.1000E-01 0.0000E-01 0.0000E-01 0.3000E+07 0.2000E-01 184 3 53  370
                                            0.0000E-01 0.0000E-01 184 3 53  371
.74184E 05 .18237E 03          0          0                       184 3  0  372
0.0       -.90300E 06          0          4          0          0 184 3 54  373
        17          2          0          0          1         17 184 3 54  374
0.9080E+06 0.0000E-01 0.1000E+07 0.2000E+00                       184 3 54  375
0.1200E+07 0.3450E+00 0.1300E+07 0.3650E+00 0.1100E+07 0.3000E+00 184 3 54  376
0.1500E+07 0.3520E+00 0.1600E+07 0.3400E+00 0.1400E+07 0.3650E+00 184 3 54  377
0.2000E+07 0.2450E+00 0.2200E+07 0.1950E+00 0.1800E+07 0.2950E+00 184 3 54  378
0.2600E+07 0.1100E+00 0.2800E+07 0.8000E-01 0.2400E+07 0.1450E+00 184 3 54  379
0.3500E+07 0.3200E-01 0.4000E+07 0.2000E-01 0.3000E+07 0.6000E-01 184 3 54  380
                                            0.0000E-01 0.0000E-01 184 3 54  381
.74184E 05 .18237E 03          0          0                       184 3  0  382
0.0       -.99950E 06          0          5          0          0 184 3 55  383
        16          2          0          0          1         16 184 3 55  384
                                                                  184 3 55  385
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APPENDIX: EXPERIMENTAL EVALUATED DATA SETS (Contd.)

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```
0.1005E+07 0.0000E-01 0.1100E+07 0.1500E+00 0.1200E+07 0.2750E+00 184 3 55  386
0.1300E+07 0.3200E+00 0.1400E+07 0.3300E+00 0.1500E+07 0.3280E+00 184 3 55  387
0.1600E+07 0.3100E+00 0.1800E+07 0.2750E+00 0.2000E+07 0.2300E+00 184 3 55  388
0.2200E+07 0.1800E+00 0.2400E+07 0.1400E+00 0.2600E+07 0.1020E+00 184 3 55  389
0.2800E+07 0.7000E-01 0.3000E+07 0.4200E-01 0.3500E+07 0.2500E-01 184 3 55  390
0.4000E+07 0.2000E-01 0.0000E-01 0.0000E-01 0.0000E-01 0.0000E-01 184 3 55  391
                                                                  184 3  0  392
.74184E 05 .18237E 03          0          6          0          0 184 3 56  393
0.0        -.11248E 07         0          0          1         16 184 3 56  394
        16          2                                             184 3 56  395
0.1131E+07 0.0000E-01 0.1200E+07 0.1900E+00 0.1300E+07 0.3500E+00 184 3 56  396
0.1400E+07 0.4400E+00 0.1500E+07 0.4700E+00 0.1600E+07 0.4680E+00 184 3 56  397
0.1700E+07 0.4500E+00 0.1800E+07 0.4280E+00 0.2000E+07 0.3700E+00 184 3 56  398
0.2200E+07 0.3100E+00 0.2400E+07 0.2510E+00 0.2600E+07 0.1950E+00 184 3 56  399
0.2800E+07 0.1400E+00 0.3000E+07 0.1020E+00 0.3500E+07 0.3800E-01 184 3 56  400
0.4000E+07 0.2000E-01 0.0000E-01 0.0000E-01 0.0000E-01 0.0000E-01 184 3 56  401
                                                                  184 3  0  402
.74184E 05 .18237E 03          0          7          0          0 184 3 57  403
0.0        -.12600E 07         0          0          1         13 184 3 57  404
        13          2                                             184 3 57  405
0.1287E+07 0.0000E-01 0.1400E+07 0.1300E+00 0.1500E+07 0.1900E+00 184 3 57  406
0.1600E+07 0.2200E+00 0.1700E+07 0.2350E+00 0.1800E+07 0.2400E+00 184 3 57  407
0.1900E+07 0.2380E+00 0.2000E+07 0.2350E+00 0.2200E+07 0.2100E+00 184 3 57  408
0.2400E+07 0.1800E+00 0.2300E+07 0.1250E+00 0.3500E+07 0.4500E-01 184 3 57  409
0.4000E+07 0.2200E-01 0.0000E-01 0.0000E-01 0.0000E-01 0.0000E-01 184 3 57  410
                                                                  184 3  0  411
.74184E 05 .18237E 03          0          8          0          0 184 3 58  412
0.0        -.13755E 07         0          0          1         11 184 3 58  413
        11          2                                             184 3 58  414
0.1383E+07 0.0000E-01 0.1400E+07 0.5000E-01 0.1500E+07 0.1000E-00 184 3 58  415
0.1600E+07 0.1300E+00 0.1800E+07 0.1620E+00 0.2000E+07 0.1750E+00 184 3 58  416
0.2200E+07 0.1700E+00 0.2500E+07 0.1400E+00 0.3000E+07 0.7500E-01 184 3 58  417
0.3500E+07 0.3000E-01 0.4000E+07 0.2000E-01 0.0000E-01 0.0000E-01 184 3 58  418
                                                                  184 3  0  419
.74184E 05 .18237E 03          0          9          0          0 184 3 59  420
0.0        -.14352E 07         0          0          1         11 184 3 59  421
        11          2                                             184 3 59  422
0.1443E+07 0.0000E-01 0.1500E+07 0.3500E-01 0.1600E+07 0.9500E-01 184 3 59  423
0.1800E+07 0.1550E+00 0.2000E+07 0.1750E+00 0.2200E+07 0.1740E+00 184 3 59  424
0.2400E+07 0.1620E+00 0.2600E+07 0.1380E+00 0.3000E+07 0.8500E-01 184 3 59  425
0.3500E+07 0.2700E-01 0.4000E+07 0.2200E-01 0.0000E-01 0.0000E-01 184 3 59  426
                                                                  184 3  0  427
.74184E 05 .18237E 03          0         10          0          0 184 3 60  428
0.0.       -.15376E 07         0          0          1         10 184 3 60  429
        10          2                                             184 3 60  430
0.1546E+07 0.0000E-01 0.1700E+07 0.7000E-01 0.1900E+07 0.1160E+00 184 3 60  431
0.2000E+07 0.1270E+00 0.2100E+07 0.1310E+00 0.2200E+07 0.1290E+00 184 3 60  432
0.2500E+07 0.1180E+00 0.3000E+07 0.7000E-01 0.3500E+07 0.3000E-01 184 3 60  433
0.4000E+07 0.2000E-01 0.0000E-01 0.0000E-01 0.0000E-01 0.0000E-01 184 3 60  434
                                                                  184 3  0  435
.74184E 05 .18237E 03          0         11          0          0 184 3 61  436
0.0        -.16132E 07         0          0          1          9 184 3 61  437
         9          2                                             184 3 61  438
0.1622E+07 0.0000E-01 0.1800E+07 0.9000E-01 0.2000E+07 0.1300E+00 184 3 61  439
0.2200E+07 0.1420E+00 0.2400E+07 0.1410E+00 0.2600E+07 0.1350E+00 184 3 61  440
0.3000E+07 0.9000E-01 0.3500E+07 0.3500E-01 0.4000E+07 0.2200E-01 184 3 61  441
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.74184E 05 .18237E 03            0             12            0               184 3  0   442
0.0        -.16669E 07           0              0            1             0 184 3 62   443
         9           2                                                     9 184 3 62   444
0.1676E+07 0.0000E-01 0.1600E+07 0.7000E-01 0.2000E+07 0.1100E+00 184 3 62   445
0.2200E+07 0.1300E+00 0.2400E+07 0.1310E+00 0.2600E+07 0.1290E+00 184 3 62   446
0.3000E+07 0.9500E-01 0.3500E+07 0.5600E-01 0.4000E+07 0.4100E-01 184 3 62   447
                                                                  184 3 62   448
.74184E 05 .18237E 03            0             13            0               184 3  0   449
0.0        -.17564E 07           0              0            1             0 184 3 63   450
        11           2                                                    11 184 3 63   451
0.1766E+07 0.0000E-01 0.1800E+07 0.8000E-01 0.2000E+07 0.2450E+00 184 3 63   452
0.2200E+07 0.3200E+00 0.2300E+07 0.3350E+00 0.2400E+07 0.3320E+00 184 3 63   453
0.2600E+07 0.3150E+00 0.2800E+07 0.2600E+00 0.3000E+07 0.1900E+00 184 3 63   454
0.3500E+07 0.7500E-01 0.4000E+07 0.3500E-01 0.0000E-01 0.0000E-01 184 3 63   455
                                                                  184 3 63   456
.74184E 05 .18237E 03            0             14            0               184 3  0   457
0.0        -.19106E 07           0              0            1             0 184 3 64   458
         9           2                                                     9 184 3 64   459
0.1921E+07 0.0000E-01 0.2000E+07 0.6500E-01 0.2200E+07 0.1400E+00 184 3 64   460
0.2400E+07 0.1700E+00 0.2600E+07 0.1720E+00 0.2800E+07 0.1700E+00 184 3 64   461
0.3000E+07 0.1520E+00 0.3500E+07 0.8000E-01 0.4000E+07 0.5000E-01 184 3 64   462
                                                                  184 3 64   463
.74184E 05 .18237E 03            0             15            0               184 3  0   464
0.0        -.20080E 07           0              0            1             0 184 3 65   465
         9           2                                                     9 184 3 65   466
0.2019E+07 0.0000E-01 0.2100E+07 0.9000E-01 0.2200E+07 0.1400E+00 184 3 65   467
0.2400E+07 0.2000E+00 0.2600E+07 0.2200E+00 0.2800E+07 0.2100E+00 184 3 65   468
0.3000E+07 0.1800E+00 0.3500E+07 0.9500E-01 0.4000E+07 0.5500E-01 184 3 65   469
                                                                  184 3 65   470
.74184E 05 .18237E 03            0             16            0               184 3  0   471
0.0        -.21045E 07           0              0            1             0 184 3 66   472
         8           2                                                     8 184 3 66   473
0.2116E+07 0.0000E-01 0.2200E+07 0.1050E+00 0.2400E+07 0.2100E+00 184 3 66   474
0.2600E+07 0.2400E+00 0.2800E+07 0.2300E+00 0.3000E+07 0.1950E+00 184 3 66   475
0.3500E+07 0.9200E-01 0.4000E+07 0.5600E-01 0.0000E-01 0.0000E-01 184 3 66   476
                                                                  184 3 66   477
.74184E 05 .18237E 03            0             17            0               184 3  0   478
0.0        -.21970E 07           0              0            1             0 184 3 67   479
         8           2                                                     8 184 3 67   480
0.2209E+07 0.0000E-01 0.2300E+07 0.1200E+00 0.2400E+07 0.1900E+00 184 3 67   481
0.2600E+07 0.2400E+00 0.2800E+07 0.2250E+00 0.3000E+07 0.2000E+00 184 3 67   482
0.3500E+07 0.1200E+00 0.4000E+07 0.6500E-01 0.0000E-01 0.0000E-01 184 3 67   483
                                                                  184 3 67   484
.74184E 05 .18237E 03            0             18            0               184 3  0   485
0.0        -.23114E 07           0              0            1             0 184 3 68   486
         9           2                                                     9 184 3 68   487
0.2324E+07 0.0000E-01 0.2400E+07 0.8000E-01 0.2600E+07 0.1600E+00 184 3 68   488
0.2800E+07 0.1850E+00 0.3000E+07 0.1860E+00 0.3200E+07 0.1700E+00 184 3 68   489
0.3400E+07 0.1350E+00 0.3600E+07 0.1000E-00 0.4000E+07 0.6000E-01 184 3 68   490
                                                                  184 3 68   491
.74184E 05 .18237E 03            0             19            0               184 3  0   492
0.0        -.24397E 07           0              0            1             0 184 3 69   493
         8           2                                                     8 184 3 69   494
0.2453E+07 0.0000E-01 0.2600E+07 0.1100E+00 0.2800E+07 0.1650E+00 184 3 69   495
0.3000E+07 0.1700E+00 0.3200E+07 0.1630E+00 0.3400E+07 0.1400E+00 184 3 69   496
                                                                  184 3 69   497
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0.3600E+07 0.1160E+00 0.4000E+07 0.6000E-01 0.0000E-01 0.0000E-01 184 3 69  498
                                                                  184 3  0  499
.74184E 05 .18237E 03          0         20          0          0 184 3 70  500
0.0       -.25193E 07          0          0          1          8 184 3 70  501
         8          2                                             184 3 70  502
0.2533E+07 0.0000E-01 0.2600E+07 0.5000E-01 0.2800E+07 0.1200E+00 184 3 70  503
0.3000E+07 0.1400E+00 0.3200E+07 0.1400E+00 0.3400E+07 0.1310E+00 184 3 70  504
0.3600E+07 0.1120E+00 0.4000E+07 0.8500E-01 0.0000E-01 0.0000E-01 184 3 70  505
                                                                  184 3  0  506
.74184E 05 .18237E 03          0         21          0          0 184 3 71  507
0.0       -.25799E 07          0          0          1          5 184 3 71  508
         5          2                                             184 3 71  509
0.2594E+07 0.0000E-01 0.2800E+07 0.9000E-01 0.3000E+07 0.1100E+00 184 3 71  510
0.3200E+07 0.1100E+00 0.4000E+07 0.7500E-01 0.0000E-01 0.0000E-01 184 3 71  511
                                                                  184 3  0  512
.74184E 05 .18237E 03          0         22          0          0 184 3 72  513
0.0       -.26376E 07          0          0          1          6 184 3 72  514
         6          2                                             184 3 72  515
0.2652E+07 0.0000E-01 0.2800E+07 0.8000E-01 0.3000E+07 0.1100E+00 184 3 72  516
0.3200E+07 0.1150E+00 0.3400E+07 0.1000E-00 0.4000E+07 0.7200E-01 184 3 72  517
                                                                  184 3  0  518
.74184E 05 .18237E 03          0         23          0          0 184 3 73  519
0.0       -.26625E 07          0          0          1          5 184 3 73  520
         5          2                                             184 3 73  521
0.2677E+07 0.0000E-01 0.2800E+07 0.7000E-01 0.3000E+07 0.1000E-00 184 3 73  522
0.3200E+07 0.1000E-00 0.4000E+07 0.7500E-01 0.0000E-01 0.0000E-01 184 3 73  523
                                                                  184 3  0  524
.74184E 05 .18237E 03          0         24          0          0 184 3 74  525
0.0       -.27341E 07          0          0          1          4 184 3 74  526
         4          2                                             184 3 74  527
0.2749E+07 0.0000E-01 0.3000E+07 0.8500E-01 0.3400E+07 0.8500E-01 184 3 74  528
0.4000E+07 0.5000E-01 0.0000E-01 0.0000E-01 0.0000E-01 0.0000E-01 184 3 74  529
                                                                  184 3  0  530
.74184E 05 .13237E 03          0         25          0          0 184 3 75  531
0.0       -.28107E 07          0          0          1          5 184 3 75  532
         5          2                                             184 3 75  533
0.2826E+07 0.0000E-01 0.3000E+07 0.7000E-01 0.3200E+07 0.1000E-00 184 3 75  534
0.3400E+07 0.1000E-00 0.4000E+07 0.7000E-01 0.0000E-01 0.0000E-01 184 3 75  535
                                                                  184 3  0  536
.74184E 05 .18237E 03          0         26          0          0 184 3 76  537
0.0       -.28654E 07          0          0          1          5 184 3 76  538
         5          2                                             184 3 76  539
0.2881E+07 0.0000E-01 0.3000E+07 0.7000E-01 0.3200E+07 0.1000E-00 184 3 76  540
0.3400E+07 0.1000E-00 0.4000E+07 0.7000E-01 0.0000E-01 0.0000E-01 184 3 76  541
                                                                  184 3  0  542
.74184E 05 .18237E 03          0         27          0          0 184 3 77  543
0.0       -.29171E 07          0          0          1          5 184 3 77  544
         5          2                                             184 3 77  545
0.2933E+07 0.0000E-01 0.3000E+07 0.6000E-01 0.3200E+07 0.1300E+00 184 3 77  546
0.3400E+07 0.1300E+00 0.4000E+07 0.1150E+00 0.0000E-01 0.0000E-01 184 3 77  547
                                                                  184 3  0  548
.74184E 05 .18237E 03          0         27          0          0 184 3 78  549
0.0       -.29658E 07          0          0          1          4 184 3 78  550
         4          2                                             184 3 78  551
0.2982E+07 0.0000E-01 0.3200E+07 0.9000E-01 0.3400E+07 0.9000E-01 184 3 78  552
0.4000E+07 0.6000E-01 0.0000E-01 0.0000E-01 0.0000E-01 0.0000E-01 184 3 78  553
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.74184E 05 .18237E 03          0          99           0            184 3  0  554
0.0       -.29838E 07          0           0           1          0 184 3 91  555
        8          2                                              8 184 3 91  556
0.3000E+07 0.0000E-01 0.3200E+07 0.1120E+00 0.3300E+07 0.3136E+00 184 3 91  557
0.3400E+07 0.5376E+00 0.3500E+07 0.7840E+00 0.3600E+07 0.9408E+00 184 3 91  558
0.3800E+07 0.1165E+01 0.4000E+07 0.1344E+01 0.1233E+06 0.8991E+01 184 3 91  559
                                                                  184 3 91  560
.74184E 05 .18237E 03          0          99           0            184 3  0  561
0.0        0.0                 0           0           1          0 184 3102  562
       18          2                                             18 184 3102  563
0.1000E+06 0.2100E+00 0.1116E+06 0.2000E+00 0.1500E+06 0.1650E+00 184 3102  564
0.1750E+06 0.1220E+00 0.2000E+06 0.1030E+00 0.2500E+06 0.9000E-01 184 3102  565
0.3000E+06 0.8100E-01 0.4000E+06 0.8100E-01 0.5000E+06 0.7800E-01 184 3102  566
0.6000E+06 0.7700E-01 0.7000E+06 0.7700E-01 0.8000E+06 0.8000E-01 184 3102  567
0.9000E+06 0.8100E-01 0.1000E+07 0.8000E-01 0.1500E+07 0.5900E-01 184 3102  568
0.2000E+07 0.3900E-01 0.3000E+07 0.2250E-01 0.4000E+07 0.6500E-02 184 3102  569
                                                                  184 3102  570
                                                                  184 3  0  571
.74184E 05 .18237E 03          0           1           0            184 0  0  572
0.0        .18237E 03          0           1           1          0 184 4  2  573
       14          2                                             14 184 4  2  574
.00000E 00 .10000E-04          0           0           1            184 4  2  575
.10000E-05 .00000E 00 .00000E 00 .00000E 00 . 0000E 00 .00000E 00 0 184 4  2  576
.00000E 00 .10000E 06          0           0           2            184 4  2  577
.46667E-01 .14000E-01 .00000E 00 .00000E 00 .00000E 00 .00000E 00 0 184 4  2  578
.00000E 00 .20000E 06          0           0           4            184 4  2  579
.12000E 00 .40000E-01 .42857E-02 .11111E-02 .00000E 00 .00000E 00 0 184 4  2  580
.00000E 00 .40000E 06          0           0           4            184 4  2  581
.26333E 00 .12400E 00 .20000E-01 .55556E-02 .00000E 00 .00000E 00 0 184 4  2  582
.00000E 00 .60000E 06          0           0           4            184 4  2  583
.35000E 00 .20600E 00 .52857E-01 .16667E-01 .00000E 00 .00000E 00 0 184 4  2  584
.00000E 00 .80000E 06          0           0           6            184 4  2  585
.42000E 00 .28200E 00 .97143E-01 .32222E-01 .36364E-02 .38462E-03 0 184 4  2  586
.00000E 00 .10000E 07          0           0           6            184 4  2  587
.45667E 00 .34400E 00 .14857E 00 .55556E-01 .10000E-01 .30769E-02 0 184 4  2  588
.00000E 00 .14000E 07          0           0           6            184 4  2  589
.52333E 00 .43400E 00 .25571E 00 .12000E 00 .31818E-01 .10385E-01 0 184 4  2  590
.00000E 00 .18000E 07          0           0           8            184 4  2  591
.68333E 00 .50400E 00 .34571E 00 .18000E 00 .58636E-01 .18462E-01 0 184 4  2  592
.13333E-02 .58824E-04 .00000E 00 .00000E 00 .00000E 00 .00000E 00   184 4  2  593
.00000E 00 .22000E 07          0           0           8            184 4  2  594
.74667E 00 .55800E 00 .39857E 00 .22556E 00 .88182E-01 .30769E-01 0 184 4  2  595
.56667E-02 .11765E-02 .00000E 00 .00000E 00 .00000E 00 .00000E 00   184 4  2  596
.00000E 00 .26000E 07          0           0           8            184 4  2  597
.79667E 00 .60800E 00 .43429E 00 .26222E 00 .11636E 00 .45385E-01 0 184 4  2  598
.11667E-01 .26471E-02 .00000E 00 .00000E 00 .00000E 00 .00000E 00   184 4  2  599
0.0000E-01 0.3000E+07          0           0          10            184 4  2  600
0.8188E+00 0.6456E+00 0.4676E+00 0.2988E+00 0.1458E+00 0.6500E-01 0 184 4  2  601
0.2312E-01 0.7531E-02 0.1861E-02 0.8346E-03 0.0000E-01 0.0000E-01   184 4  2  602
0.0000E-01 0.3500E+07          0           0          12            184 4  2  603
0.8368E+00 0.6779E+00 0.5023E+00 0.3392E+00 0.1810E+00 0.8616E-01 0 184 4  2  604
0.3621E-01 0.1140E-01 0.3582E-02 0.2016E-02 0.9914E-03 0.3221E-03   184 4  2  605
0.0000E-01 0.4000E+07          0           0          12            184 4  2  606
0.8433E+00 0.6900E+00 0.5200E+00 0.3622E+00 0.2045E+00 0.1015E+00 0 184 4  2  607
0.4427E-01 0.1676E-01 0.6158E-02 0.3914E-02 0.2387E-02 0.1016E-02   184 4  2  608
                                                                    184 4  2  609
```

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```
                                                                        184 4  0   610
                                                            0         0 184 4 51   611
,74184E 05 ,18237E 03         0           1                          15 184 4 51   612
0.0        ,18237E 03         0           1             1               184 4 51   613
     15             2                                   2             0 184 4 51   614
                              0           0
,00000E 00 ,11180E 06                                                 00 184 4 51  615
,33333E-03 ,20000E-04 ,00000E 00 .00000E 00 ,00000E 00 ,00000E 00     0 184 4 51   616
                              0           0             4
,00000E 00 ,20000E 06                                               00 184 4 51    617
,66667E-02 ,20000E-03 ,14286E-04 ,11111E-05 ,00000E 00 .00000E 00     0 184 4 51   618
                              0           0             4
,00000E 00 ,40000E 06                                               00 184 4 51    619
,66667E-02-,20000E-02 ,14286E-03 ,11111E-04 ,00000E 00 ,00000E 00     0 184 4 51   620
                              0           0             4
,00000E 00 ,60000E 06                                               00 184 4 51    621
,13333E-01-,40000E-02 ,21429E-02 ,11111E-03 ,00000E 00 ,00000E 00     0 184 4 51   622
                              0           0             4
,00000E 00 ,80000E 06                                               00 184 4 51    623
,23333E-01-,80000E-02 ,38571E-02 ,11111E-03 ,00000E 00 ,00000E 00     0 184 4 51   624
                              0           0             4
,00000E 00 ,10000E 07                                               00 184 4 51    625
,26333E-01-,12000E-01 ,85714E-02 ,11111E-03 ,00000E 00 ,00000E 00     0 184 4 51   626
                              0           0             4
,00000E 00 ,12000E 07                                               00 184 4 51    627
,40000E-01-,17000E-01 ,11429E-01 ,11111E-03 ,00000E 00 ,00000E 00     0 184 4 51   628
                              0           0             4
,00000E 00 ,14000E 07                                               00 184 4 51    629
,50000E-01-,18000E-01 ,18571E-01-,11111E-02 ,00000E 00 ,00000E 00     0 184 4 51   630
                              0           0             4
,00000E 00 ,16000E 07                                               00 184 4 51    631
,60000E-01-,18000E-01 ,24286E-01-,33333E-02 ,00000E 00 ,00000E 00     0 184 4 51   632
                              0           0             4
,00000E 00 ,18000E 07                                               00 184 4 51    633
,76667E-01-,13000E-01 ,30000E-01-,50000E-02 ,00000E 00 ,00000E 00     0 184 4 51   634
                              0           0             4
,00000E 00 ,20000E 07                                               00 184 4 51    635
,93333E-01-,60000E-02 ,37143E-01-,44444E-02 ,00000E 00 ,00000E 00     0 184 4 51   636
                              0           0             6
,00000E 00 ,25000E 07                                          ,15385E-02 184 4 51 637
,16000E 00 ,26000E-01 ,57143E-01 ,11111E-02-,90909E-03                0 184 4 51   638
                              0           0             8
,00000E 00 ,30000E 07                                    -,14154E-01 184 4 51      639
,24867E 00 ,62000E-01 ,71571E-01 ,14556E-01 ,64273E-02 ,00000E 00 184 4 51         640
-,52000E-02 ,56118E-02 ,00000E 00 ,00000E 00 ,00000E 00               0 184 4 51   641
                              0           0             8
,00000E 00 ,35000E 07                                    -,32769E-01 184 4 51      642
,28567E 00 ,63600E-01 ,52857E-01 ,26778E-01 ,10091E-01 ,00000E 00 184 4 51         643
-,56933E-02 ,10059E-01 ,00000E 00 ,00000E 00 ,00000E 00               0 184 4 51   644
                              0           0             8
,00000E 00 ,40000E 07                                    -,46077E-01 184 4 51      645
,27533E 00 ,47400E-01 ,24857E-01-,62222E-03-,26273E-01 ,00000E 00 184 4 51         646
,28133E-02 ,11235E-01 ,00000E 00 ,00000E 00 ,00000E 00                 184 4  0    647
                                                                      0 184 4 52   648
,74184E 05 ,18237E 03         0           1             0             9 184 4 52   649
0.0        ,18237E 03         0           1             1               184 4 52   650
      9             2                                                 0 184 4 52   651
                              0           0             0
,00000E 00 ,36597E 06                                               ,00000E 00 184 4 52  652
,00000E 00 ,00000E 00 ,00000E 00 ,00000E  0 , 0000E 00                0 184 4 52   653
                              0           0             2
,00000E 00 ,5 00 E 06                                               ,00000E 00 184 4 52  654
,33333E-03-,20000E-03 ,00000E 00 ,00000E 00 ,00000E 00                0 184 4 52   655
                              0           0             2
,00000E 00 ,10000E 07                                               ,00000E 00 184 4 52  656
,33333E-02-,20000E-02 ,00000E 00 ,00000E 00 ,00000E 00                0 184 4 52   657
                              0           0             2
,00000E 00 ,15000E 07                                               ,00000E 00 184 4 52  658
,11667E-01-,50000E-02 ,00000E 00 ,00000E 00 ,00000E 00                0 184 4 52   659
                              0           0             4
,00000E 00 ,20000E 07                                               ,00000E 00 184 4 52  660
,33333E-01-,12000E-01 ,42857E-02 ,11111E-02 ,00000E 00                0 184 4 52   661
                              0           0             4
,00000E 00 ,25000E 07                                               ,00000E 00 184 4 52  662
,60000E-01-,16000E-01 ,10000E-01 ,16667E-02 ,00000E 00                0 184 4 52   663
                              0           0             4
,00000E 00 ,30000E 07                                               ,00000E 00 184 4 52  664
,90000E-01-,16000E-01 ,15714E-01 ,38889E-02 ,00000E 00                0 184 4 52   665
                              0           0             4
,00000E 00 ,35000E 07
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APPENDIX: EXPERIMENTAL EVALUATED DATA SETS (Contd.)

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```
.12333E 00-.12000E-01 .21429E-01 .72222E-02 .00000E 00 .00000E 00 184 4 52  666
.00000E 00 .40000E 07          0          0          4            0 184 4 52  667
.16333E 00-.40000E-02 .28571E-01 .12222E-01 .00000E 00 .00000E 00 184 4 52  668

.74184E 05 .18237E 03          0          0          0              184 4  0  669
0.0        .18237E 03          1          1          0            0 184 4 53  670
                                                                    0 184 4 53  671

.74184E 05 .18237E 03          0          0          0              184 4  0  672
0.0        .18237E 03          1          1          0            0 184 4 54  673
                                                                    0 184 4 54  674

.74184E 05 .18237E 03          0          0          0              184 4  0  675
0.0        .18237E 03          1          1          0            0 184 4 55  676
                                                                    0 184 4 55  677

.74184E 05 .18237E 03          0          0          0              184 4  0  678
0.0        .18237E 03          1          1          0            0 184 4 56  679
                                                                    0 184 4 56  680

.74184E 05 .18237E 03          0          0          0              184 4  0  681
0.0        .18237E 03          1          1          0            0 184 4 57  682
                                                                    0 184 4 57  683

.74184E 05 .18237E 03          0          0          0              184 4  0  684
0.0        .18237E 03          1          1          0            0 184 4 58  685
                                                                    0 184 4 58  686

.74184E 05 .18237E 03          0          0          0              184 4  0  687
0.0        .18237E 03          1          1          0            0 184 4 59  688
                                                                    0 184 4 59  689

.74184E 05 .18237E 03          0          0          0              184 4  0  690
0.0        .18237E 03          1          1          0            0 184 4 60  691
                                                                    0 184 4 60  692

.74184E 05 .18237E 03          0          0          0              184 4  0  693
0.0        .18237E 03          1          1          0            0 184 4 61  694
                                                                    0 184 4 61  695

.74184E 05 .18237E 03          0          0          0              184 4  0  696
0.0        .18237E 03          1          1          0            0 184 4 62  697
                                                                    0 184 4 62  698

.74184E 05 .18237E 03          0          0          0              184 4  0  699
0.0        .18237E 03          1          1          0            0 184 4 63  700
                                                                    0 184 4 63  701

.74184E 05 .18237E 03          0          0          0              184 4  0  702
0.0        .18237E 03          1          1          0            0 184 4 64  703
                                                                    0 184 4 64  704

.74184E 05 .18237E 03          0          0          0              184 4  0  705
0.0        .18237E 03          1          1          0            0 184 4 65  706
                                                                    0 184 4 65  707

.74184E 05 .18237E 03          0          0          0              184 4  0  708
0.0        .18237E 03          1          1          0            0 184 4 66  709
                                                                    0 184 4 66  710

.74184E 05 .18237E 03          0          0          0              184 4  0  711
0.0        .18237E 03          1          1          0            0 184 4 67  712
                                                                    0 184 4 67  713

.74184E 05 .18237E 03          0          0          0              184 4  0  714
0.0        .18237E 03          1          1          0            0 184 4 68  715
                                                                    0 184 4 68  716

.74184E 05 .18237E 03          0          0          0              184 4  0  717
0.0        .18237E 03          1          1          0            0 184 4 69  718
                                                                    0 184 4 69  719

.74184E 05 .18237E 03          0          0          0              184 4  0  720
                                                                    0 184 4 70  721
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APPENDIX: EXPERIMENTAL EVALUATED DATA SETS (Contd.)

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```
0.0        .18237E 03          1          1          0          0 184 4 70   722
                                                                  184 4  0   723
.74187E 05 .18237E 03          0          0          0          0 184 4 71   724
0.0        .18237E 03          1          1          0          0 184 4 71   725
                                                                  184 4  0   726
.74187E 05 .18237E 03          0          0          0          0 184 4 72   727
0.0        .18237E 03          1          1          0          0 184 4 72   728
                                                                  184 4  0   729
.74184E 05 .18237E 03          0          0          0          0 184 4 73   730
0.0        .18237E 03          1          1          0          0 184 4 73   731
                                                                  184 4  0   732
.74184E 05 .18237E 03          0          0          0          0 184 4 74   733
0.0        .18237E 03          1          1          0          0 184 4 74   734
                                                                  184 4  0   735
.74184E 05 .18237E 03          0          0          0          0 184 4 75   736
0.0        .18237E 03          1          1          0          0 184 4 75   737
                                                                  184 4  0   738
.74184E 05 .18237E 03          0          0          0          0 184 4 76   739
0.0        .18237E 03          1          1          0          0 184 4 76   740
                                                                  184 4  0   741
.74184E 05 .18237E 03          0          0          0          0 184 4 77   742
0.0        .18237E 03          1          1          0          0 184 4 77   743
                                                                  184 4  0   744
.74184E 05 .18237E 03          0          0          0          0 184 4 78   745
0.0        .18237E 03          1          1          0          0 184 4 78   746
                                                                  184 4  0   747
.74184E 05 .18237E 03          0          0          0          0 184 4 91   748
0.0        .18237E 03          1          1          0          0 184 4 91   749
                                                                  184 4  0   750
                                                                  184 0  0   751
                                                                   -1 0  0   752
*EØF

CCCC    W-186                                                     186 0  0     0
.74186E 05 .18436E 03          0          0          0          1 186 1451     1
0.0        0.0                 0          0          0          0 186 1451     2
0.0        0.0                 0          0          4         63 186 1451     3
-----------------------------------------------------------------  186 1451     4
W-186 EVALUATIØN, CØMPØNENTS FØR MASTER FILE, A, SMITH ET AL.,    186 1451     5
REFERENCE ANL/NDM-56(1981).                                       186 1451     6
-----------------------------------------------------------------  186 1451     7
                               1        451         70          1 186 1451     8
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                               3          2        121          1 186 1451    10
                               3          4         29          1 186 1451    11
                               3         51         12          1 186 1451    12
                               3         52          9          1 186 1451    13
                               3         53          9          1 186 1451    14
                               3         54         11          1 186 1451    15
                               3         55          8          1 186 1451    16
                               3         56          9          1 186 1451    17
                               3         57          8          1 186 1451    18
                               3         58          8          1 186 1451    19
                               3         59          9          1 186 1451    20
                               3         60          8          1 186 1451    21
                               3         61          8          1 186 1451    22
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		3	62	7	1	186	1	451	23
		3	63	7	1	186	1	451	24
		3	64	6	1	186	1	451	25
		3	65	6	1	186	1	451	26
		3	66	6	1	186	1	451	27
		3	67	5	1	186	1	451	28
		3	68	5	1	186	1	451	29
		3	69	5	1	186	1	451	30
		3	70	5	1	186	1	451	31
		3	71	5	1	186	1	451	32
		3	72	5	1	186	1	451	33
		3	73	5	1	186	1	451	34
		3	74	5	1	186	1	451	35
		3	75	5	1	186	1	451	36
		3	76	5	1	186	1	451	37
		3	77	5	1	186	1	451	38
		3	78	5	1	186	1	451	39
		3	91	7	1	186	1	451	40
		3	102	9	1	186	1	451	41
		4	2	37	1	186	1	451	42
		4	51	36	1	186	1	451	43
		4	52	21	1	186	1	451	44
		4	53	2	1	186	1	451	45
		4	54	2	1	186	1	451	46
		4	55	2	1	186	1	451	47
		4	56	2	1	186	1	451	48
		4	57	2	1	186	1	451	49
		4	58	2	1	186	1	451	50
		4	59	2	1	186	1	451	51
		4	60	2	1	186	1	451	52
		4	61	2	1	186	1	451	53
		4	62	2	1	186	1	451	54
		4	63	2	1	186	1	451	55
		4	64	2	1	186	1	451	56
		4	65	2	1	186	1	451	57
		4	66	5	1	186	1	451	58
		4	67	5	1	186	1	451	59
		4	68	2	1	186	1	451	60
		4	69	2	1	186	1	451	61
		4	70	2	1	186	1	451	62
		4	71	2	1	186	1	451	63
		4	72	2	1	186	1	451	64
		4	73	2	1	186	1	451	65
		4	74	2	1	186	1	451	66
		4	75	2	1	186	1	451	67
		4	76	2	1	186	1	451	68
		4	77	2	1	186	1	451	69
		4	91	2	1	186	1	451	70
						186	1	0	71
						186	0	0	72
,74186E 05	,18436E 03	0	99	0	0	186	3	1	73
0,0	0,0	0	0	1	362	186	3	1	74
362	2					186	3	1	75
0,1000E+06	0,9807E+01	0,1110E+06	0,9380E+01	0,1130E+06	0,9346E+01	186	3	1	76
0,1150E+06	0,9313E+01	0,1170E+06	0,9247E+01	0,1190E+06	0,9195E+01	186	3	1	77
0,1211E+06	0,9182E+01	0,1231E+06	0,9184E+01	0,1233E+06	0,9186E+01	186	3	1	78

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0.1250E+06	0.9204E+01	0.1251E+06	0.9205E+01	0.1271E+06	0.9218E+01	186	3	1	79
0.1291E+06	0.9209E+01	0.1311E+06	0.9166E+01	0.1331E+06	0.9102E+01	186	3	1	80
0.1351E+06	0.9042E+01	0.1371E+06	0.9002E+01	0.1391E+06	0.8979E+01	186	3	1	81
0.1412E+06	0.8926E+01	0.1432E+06	0.8815E+01	0.1452E+06	0.8711E+01	186	3	1	82
0.1472E+06	0.8659E+01	0.1500E+06	0.8597E+01	0.1502E+06	0.8593E+01	186	3	1	83
0.1512E+06	0.8566E+01	0.1532E+06	0.8573E+01	0.1552E+06	0.8586E+01	186	3	1	84
0.1582E+06	0.8581E+01	0.1592E+06	0.8573E+01	0.1612E+06	0.8565E+01	186	3	1	85
0.1632E+06	0.8590E+01	0.1652E+06	0.8612E+01	0.1672E+06	0.8596E+01	186	3	1	86
0.1692E+06	0.8615E+01	0.1713E+06	0.8631E+01	0.1733E+06	0.8591E+01	186	3	1	87
0.1750E+06	0.8553E+01	0.1753E+06	0.8546E+01	0.1773E+06	0.8496E+01	186	3	1	88
0.1803E+06	0.8405E+01	0.1813E+06	0.8362E+01	0.1833E+06	0.8316E+01	186	3	1	89
0.1843E+06	0.8269E+01	0.1877E+06	0.8229E+01	0.1899E+06	0.8176E+01	186	3	1	90
0.1910E+06	0.8120E+01	0.1932E+06	0.8125E+01	0.1954E+06	0.8116E+01	186	3	1	91
0.1987E+06	0.8104E+01	0.1999E+06	0.8108E+01	0.2000E+06	0.8107E+01	186	3	1	92
0.2021E+06	0.8093E+01	0.2053E+06	0.8145E+01	0.2073E+06	0.8159E+01	186	3	1	93
0.2093E+06	0.8178E+01	0.2113E+06	0.8179E+01	0.2133E+06	0.8147E+01	186	3	1	94
0.2154E+06	0.8130E+01	0.2174E+06	0.8117E+01	0.2194E+06	0.8092E+01	186	3	1	95
0.2214E+06	0.8084E+01	0.2234E+06	0.8034E+01	0.2254E+06	0.8005E+01	186	3	1	96
0.2284E+06	0.8014E+01	0.2294E+06	0.7976E+01	0.2314E+06	0.7948E+01	186	3	1	97
0.2334E+06	0.7971E+01	0.2354E+06	0.7987E+01	0.2384E+06	0.7951E+01	186	3	1	98
0.2404E+06	0.7948E+01	0.2424E+06	0.7948E+01	0.2444E+06	0.7957E+01	186	3	1	99
0.2464E+06	0.7945E+01	0.2474E+06	0.7924E+01	0.2494E+06	0.7891E+01	186	3	1	100
0.2500E+06	0.7882E+01	0.2514E+06	0.7861E+01	0.2544E+06	0.7737E+01	186	3	1	101
0.2564E+06	0.7693E+01	0.2584E+06	0.7695E+01	0.2594E+06	0.7694E+01	186	3	1	102
0.2614E+06	0.7682E+01	0.2634E+06	0.7660E+01	0.2654E+06	0.7626E+01	186	3	1	103
0.2674E+06	0.7603E+01	0.2694E+06	0.7583E+01	0.2714E+06	0.7575E+01	186	3	1	104
0.2734E+06	0.7631E+01	0.2754E+06	0.7640E+01	0.2775E+06	0.7655E+01	186	3	1	105
0.2795E+06	0.7653E+01	0.2815E+06	0.7646E+01	0.2835E+06	0.7616E+01	186	3	1	106
0.2865E+06	0.7555E+01	0.2875E+06	0.7548E+01	0.2895E+06	0.7500E+01	186	3	1	107
0.2915E+06	0.7443E+01	0.2935E+06	0.7368E+01	0.2955E+06	0.7341E+01	186	3	1	108
0.2975E+06	0.7292E+01	0.2995E+06	0.7244E+01	0.3000E+06	0.7234E+01	186	3	1	109
0.3015E+06	0.7202E+01	0.3037E+06	0.7220E+01	0.3047E+06	0.7226E+01	186	3	1	110
0.3069E+06	0.7199E+01	0.3092E+06	0.7176E+01	0.3114E+06	0.7173E+01	186	3	1	111
0.3136E+06	0.7136E+01	0.3156E+06	0.7103E+01	0.3181E+06	0.7067E+01	186	3	1	112
0.3213E+06	0.7033E+01	0.3235E+06	0.7021E+01	0.3255E+06	0.6996E+01	186	3	1	113
0.3275E+06	0.7021E+01	0.3295E+06	0.7028E+01	0.3315E+06	0.7074E+01	186	3	1	114
0.3335E+06	0.7141E+01	0.3355E+06	0.7187E+01	0.3385E+06	0.7172E+01	186	3	1	115
0.3395E+06	0.7207E+01	0.3415E+06	0.7196E+01	0.3435E+06	0.7198E+01	186	3	1	116
0.3455E+06	0.7182E+01	0.3475E+06	0.7175E+01	0.3495E+06	0.7224E+01	186	3	1	117
0.3515E+06	0.7230E+01	0.3535E+06	0.7238E+01	0.3555E+06	0.7238E+01	186	3	1	118
0.3575E+06	0.7256E+01	0.3595E+06	0.7270E+01	0.3615E+06	0.7282E+01	186	3	1	119
0.3636E+06	0.7313E+01	0.3656E+06	0.7351E+01	0.3676E+06	0.7346E+01	186	3	1	120
0.3696E+06	0.7311E+01	0.3716E+06	0.7271E+01	0.3736E+06	0.7236E+01	186	3	1	121
0.3756E+06	0.7232E+01	0.3776E+06	0.7228E+01	0.3796E+06	0.7202E+01	186	3	1	122
0.3816E+06	0.7202E+01	0.3836E+06	0.7183E+01	0.3866E+06	0.7148E+01	186	3	1	123
0.3876E+06	0.7142E+01	0.3896E+06	0.7103E+01	0.3916E+06	0.7091E+01	186	3	1	124
0.3936E+06	0.7087E+01	0.3956E+06	0.7092E+01	0.3976E+06	0.7059E+01	186	3	1	125
0.3989E+06	0.7075E+01	0.3996E+06	0.7084E+01	0.4000E+06	0.7082E+01	186	3	1	126
0.4016E+06	0.7072E+01	0.4046E+06	0.7071E+01	0.4056E+06	0.7074E+01	186	3	1	127
0.4076E+06	0.7050E+01	0.4096E+06	0.7073E+01	0.4116E+06	0.7078E+01	186	3	1	128
0.4136E+06	0.7090E+01	0.4156E+06	0.7069E+01	0.4176E+06	0.7097E+01	186	3	1	129
0.4196E+06	0.7095E+01	0.4226E+06	0.7078E+01	0.4236E+06	0.7065E+01	186	3	1	130
0.4256E+06	0.7080E+01	0.4276E+06	0.7082E+01	0.4296E+06	0.7083E+01	186	3	1	131
0.4316E+06	0.7093E+01	0.4336E+06	0.7090E+01	0.4356E+06	0.7081E+01	186	3	1	132
0.4376E+06	0.7099E+01	0.4406E+06	0.7096E+01	0.4416E+06	0.7100E+01	186	3	1	133
0.4436E+06	0.7088E+01	0.4456E+06	0.7057E+01	0.4476E+06	0.7056E+01	186	3	1	134

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0,4505E+06	0,7047E+01	0,4524E+06	0,7023E+01	0,4542E+06	0,7008E+01	186	3	1	135
0,4560E+06	0,6992E+01	0,4587E+06	0,6959E+01	0,4596E+06	0,6941E+01	186	3	1	136
0,4615E+06	0,6924E+01	0,4633E+06	0,6929E+01	0,4651E+06	0,6938E+01	186	3	1	137
0,4669E+06	0,6919E+01	0,4688E+06	0,6919E+01	0,4696E+06	0,6890E+01	186	3	1	138
0,4716E+06	0,6883E+01	0,4736E+06	0,6872E+01	0,4765E+06	0,6884E+01	186	3	1	139
0,4783E+06	0,6880E+01	0,4802E+06	0,6888E+01	0,4820E+06	0,6892E+01	186	3	1	140
0,4838E+06	0,6881E+01	0,4856E+06	0,6648E+01	0,4884E+06	0,6828E+01	186	3	1	141
0,4902E+06	0,6837E+01	0,4918E+06	0,6834E+01	0,4935E+06	0,6829E+01	186	3	1	142
0,4952E+06	0,6828E+01	0,4961E+06	0,6813E+01	0,4979E+06	0,6815E+01	186	3	1	143
0,4997E+06	0,6796E+01	0,5000E+06	0,6795E+01	0,5015E+06	0,6788E+01	186	3	1	144
0,5034E+06	0,6767E+01	0,5061E+06	0,6732E+01	0,5080E+06	0,6744E+01	186	3	1	145
0,5088E+06	0,6741E+01	0,5107E+06	0,6755E+01	0,5127E+06	0,6772E+01	186	3	1	146
0,5147E+06	0,6768E+01	0,5174E+06	0,6770E+01	0,5192E+06	0,6757E+01	186	3	1	147
0,5211E+06	0,6727E+01	0,5229E+06	0,6719E+01	0,5247E+06	0,6737E+01	186	3	1	148
0,5256E+06	0,6760E+01	0,5275E+06	0,6769E+01	0,5293E+06	0,6761E+01	186	3	1	149
0,5311E+06	0,6703E+01	0,5329E+06	0,6664E+01	0,5347E+06	0,6651E+01	186	3	1	150
0,5357E+06	0,6627E+01	0,5377E+06	0,6616E+01	0,5406E+06	0,6631E+01	186	3	1	151
0,5433E+06	0,6664E+01	0,5451E+06	0,6655E+01	0,5470E+06	0,6644E+01	186	3	1	152
0,5488E+06	0,6646E+01	0,5500E+06	0,6656E+01	0,5506E+06	0,6661E+01	186	3	1	153
0,5525E+06	0,6693E+01	0,5543E+06	0,6706E+01	0,5561E+06	0,6705E+01	186	3	1	154
0,5580E+06	0,6708E+01	0,5588E+06	0,6714E+01	0,5615E+06	0,6724E+01	186	3	1	155
0,5625E+06	0,6723E+01	0,5643E+06	0,6722E+01	0,5661E+06	0,6749E+01	186	3	1	156
0,5679E+06	0,6779E+01	0,5697E+06	0,6817E+01	0,5715E+06	0,6788E+01	186	3	1	157
0,5734E+06	0,6789E+01	0,5752E+06	0,6789E+01	0,5780E+06	0,6800E+01	186	3	1	158
0,5797E+06	0,6790E+01	0,5815E+06	0,6783E+01	0,5833E+06	0,6782E+01	186	3	1	159
0,5851E+06	0,6786E+01	0,5870E+06	0,6771E+01	0,5888E+06	0,6733E+01	186	3	1	160
0,5906E+06	0,6709E+01	0,5925E+06	0,6718E+01	0,5943E+06	0,6711E+01	186	3	1	161
0,5961E+06	0,6699E+01	0,5970E+06	0,6697E+01	0,5988E+06	0,6682E+01	186	3	1	162
0,5997E+06	0,6687E+01	0,6000E+06	0,6667E+01	0,6017E+06	0,6684E+01	186	3	1	163
0,6037E+06	0,6652E+01	0,6057E+06	0,6669E+01	0,6077E+06	0,6664E+01	186	3	1	164
0,6097E+06	0,6683E+01	0,6117E+06	0,6676E+01	0,6137E+06	0,6679E+01	186	3	1	165
0,6157E+06	0,6669E+01	0,6177E+06	0,6664E+01	0,6207E+06	0,6646E+01	186	3	1	166
0,6225E+06	0,6639E+01	0,6243E+06	0,6646E+01	0,6262E+06	0,6605E+01	186	3	1	167
0,6280E+06	0,6602E+01	0,6307E+06	0,6617E+01	0,6326E+06	0,6616E+01	186	3	1	168
0,6344E+06	0,6611E+01	0,6362E+06	0,6598E+01	0,6381E+06	0,6579E+01	186	3	1	169
0,6389E+06	0,6581E+01	0,6398E+06	0,6580E+01	0,6408E+06	0,6579E+01	186	3	1	170
0,6418E+06	0,6573E+01	0,6428E+06	0,6583E+01	0,6500E+06	0,6592E+01	186	3	1	171
0,7000E+06	0,6654E+01	0,7417E+06	0,6651E+01	0,7500E+06	0,6651E+01	186	3	1	172
0,8000E+06	0,6648E+01	0,8500E+06	0,6611E+01	0,8664E+06	0,6599E+01	186	3	1	173
0,9000E+06	0,6574E+01	0,9500E+06	0,6567E+01	0,9577E+06	0,6566E+01	186	3	1	174
0,1000E+07	0,6560E+01	0,1028E+07	0,6570E+01	0,1050E+07	0,6578E+01	186	3	1	175
0,1100E+07	0,6595E+01	0,1150E+07	0,6612E+01	0,1182E+07	0,6624E+01	186	3	1	176
0,1200E+07	0,6630E+01	0,1250E+07	0,6647E+01	0,1296E+07	0,6664E+01	186	3	1	177
0,1300E+07	0,6665E+01	0,1350E+07	0,6662E+01	0,1400E+07	0,6700E+01	186	3	1	178
0,1490E+07	0,6745E+01	0,1500E+07	0,6750E+01	0,1600E+07	0,6800E+01	186	3	1	179
0,1630E+07	0,6815E+01	0,1700E+07	0,6850E+01	0,1727E+07	0,6864E+01	186	3	1	180
0,1800E+07	0,6900E+01	0,1849E+07	0,6929E+01	0,1900E+07	0,6960E+01	186	3	1	181
0,1942E+07	0,6985E+01	0,2000E+07	0,7020E+01	0,2004E+07	0,7022E+01	186	3	1	182
0,2100E+07	0,7070E+01	0,2119E+07	0,7079E+01	0,2200E+07	0,7120E+01	186	3	1	183
0,2240E+07	0,7136E+01	0,2300E+07	0,7160E+01	0,2347E+07	0,7179E+01	186	3	1	184
0,2400E+07	0,7200E+01	0,2434E+07	0,7197E+01	0,2500E+07	0,7190E+01	186	3	1	185
0,2552E+07	0,7185E+01	0,2600E+07	0,7180E+01	0,2643E+07	0,7167E+01	186	3	1	186
0,2712E+07	0,7146E+01	0,2750E+07	0,7135E+01	0,2769E+07	0,7129E+01	186	3	1	187
0,2800E+07	0,7120E+01	0,2820E+07	0,7111E+01	0,2868E+07	0,7089E+01	186	3	1	188
0,2933E+07	0,7060E+01	0,2979E+07	0,7039E+01	0,3000E+07	0,7030E+01	186	3	1	189
0,3023E+07	0,7019E+01	0,3063E+07	0,7001E+01	0,3100E+07	0,6984E+01	186	3	1	190

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0,3200E+07	0,6938E+01	0,3300E+07	0,6892E+01	0.3400E+07	0,6846E+01	186	3	1	191
0,3500E+07	0,6800E+01	0,3600E+07	0,6742E+01	0.3800E+07	0,6626E+01	186	3	1	192
0,4000E+07	0,6510E+01	0,4500E+07	0,6230E+01	0.5000E+07	0.5930E+01	186	3	1	193
0,6000E+07	0,5500E+01	0,7000E+07	0.5220E+01	0.8000E+07	0.5050E+01	186	3	1	194
0,9000E+07	0,4980E+01	0,1000E+08	0,4980E+01	0.1400E+08	0,5340E+01	186	3	1	195
0,1500E+06	0,5405E+01	0,1600E+08	0.5450E+01	0.0000E-01	0,0000E-01	186	3	1	196
						186	3	0	197
,74186E 05	,18436E 03	0	99	0	0	186	3	2	198
0,0	0,0	0	0	1	352	186	3	2	199
352	2					186	3	2	200
0,1000E+06	0,9607E+01	0,1110E+06	0,9182E+01	0.1130E+06	0,9149E+01	186	3	2	201
0.1150E+06	0,9116E+01	0,1170E+06	0,9051E+01	0.1190E+06	0,8999E+01	186	3	2	202
0,1211E+06	0,8987E+01	0,1231E+06	0.8969E+01	0.1233E+06	0,8991E+01	186	3	2	203
0,1250E+06	0,8774E+01	0,1251E+06	0.8775E+01	0.1271E+06	0,8779E+01	186	3	2	204
0,1291E+06	0,8761E+01	0,1311E+06	0,8709E+01	0.1331E+06	0.8636E+01	186	3	2	205
0,1351E+06	0,8567E+01	0,1371E+06	0,8518E+01	0.1391E+06	0,8486E+01	186	3	2	206
0,1412E+06	0,8424E+01	0,1432E+06	0,8304E+01	0.1452E+06	0,8191E+01	186	3	2	207
0,1472E+06	0,8130E+01	0,1500E+06	0,8055E+01	0.1502E+06	0,8050E+01	186	3	2	208
0,1512E+06	0,8020E+01	0,1532E+06	0,8019E+01	0.1552E+06	0,8025E+01	186	3	2	209
0,1582E+06	0,8008E+01	0,1592E+06	0,7997E+01	0.1612E+06	0,7981E+01	186	3	2	210
0,1632E+06	0,7999E+01	0,1652E+06	0,8013E+01	0.1672E+06	0,7990E+01	186	3	2	211
0,1692E+06	0,8002E+01	0,1713E+06	0,8010E+01	0.1733E+06	0,7962E+01	186	3	2	212
0,1750E+06	0,7918E+01	0,1753E+06	0,7910E+01	0.1773E+06	0,7851E+01	186	3	2	213
0,1803E+06	0,7747E+01	0,1813E+06	0,7720E+01	0.1833E+06	0,7645E+01	186	3	2	214
0,1843E+06	0,7614E+01	0,1877E+06	0,7540E+01	0.1899E+06	0,7477E+01	186	3	2	215
0,1910E+06	0,7417E+01	0,1932E+06	0,7412E+01	0.1954E+06	0,7394E+01	186	3	2	216
0,1987E+06	0,7358E+01	0,1999E+06	0,7366E+01	0.2000E+06	0,7365E+01	186	3	2	217
0,2021E+06	0,7344E+01	0,2053E+06	0,7366E+01	0.2073E+06	0,7394E+01	186	3	2	218
0,2093E+06	0,7407E+01	0,2113E+06	0,7401E+01	0.2133E+06	0,7363E+01	186	3	2	219
0,2154E+06	0,7339E+01	0,2174E+06	0,7320E+01	0.2194E+06	0,7289E+01	186	3	2	220
0,2214E+06	0,7274E+01	0,2234E+06	0,7218E+01	0.2254E+06	0,7183E+01	186	3	2	221
0,2284E+06	0,7182E+01	0,2294E+06	0,7141E+01	0.2314E+06	0,7107E+01	186	3	2	222
0,2334E+06	0,7123E+01	0,2354E+06	0,7133E+01	0.2384E+06	0,7088E+01	186	3	2	223
0,2404E+06	0,7078E+01	0,2424E+06	0,7072E+01	0.2444E+06	0,7075E+01	186	3	2	224
0,2464E+06	0,7056E+01	0,2474E+06	0,7032E+01	0.2494E+06	0,6993E+01	186	3	2	225
0.2500E+06	0,6982E+01	0,2514E+06	0.6957E+01	0.2544E+06	0,6824E+01	186	3	2	226
0,2564E+06	0,6774E+01	0,2584E+06	0,6770E+01	0.2594E+06	0,6766E+01	186	3	2	227
0,2614E+06	0,6748E+01	0,2634E+06	0,6720E+01	0,2654E+06	0,6680E+01	186	3	2	228
0,2674E+06	0,6651E+01	0,2694E+06	0,6626E+01	0.2714E+06	0,6612E+01	186	3	2	229
0,2734E+06	0,6662E+01	0,2754E+06	0,6665E+01	0.2775E+06	0,6674E+01	186	3	2	230
0,2795E+06	0,6666E+01	0,2815E+06	0,6653E+01	0.2835E+06	0,6617E+01	186	3	2	231
0,2865E+06	0,6547E+01	0,2875E+06	0,6537E+01	0.2895E+06	0,6483E+01	186	3	2	232
0,2915E+06	0,6420E+01	0,2935E+06	0,6339E+01	0.2955E+06	0,6306E+01	186	3	2	233
0,2975E+06	0,6251E+01	0,2995E+06	0.6197E+01	0,3000E+06	0,6186E+01	186	3	2	234
0,3015E+06	0,6151E+01	0,3037E+06	0.6165E+01	0,3047E+06	0,6170E+01	186	3	2	235
0,3069E+06	0,6139E+01	0,3092E+06	0,6114E+01	0,3114E+06	0,6105E+01	186	3	2	236
0,3136E+06	0,6064E+01	0,3158E+06	0,6027E+01	0,3181E+06	0,5987E+01	186	3	2	237
0,3213E+06	0,5947E+01	0,3235E+06	0,5931E+01	0,3255E+06	0,5903E+01	186	3	2	238
0,3275E+06	0,5924E+01	0,3295E+06	0,5926E+01	0,3315E+06	0,5970E+01	186	3	2	239
0,3335E+06	0,6034E+01	0,3355E+06	0,6076E+01	0,3385E+06	0,6056E+01	186	3	2	240
0,3395E+06	0,6089E+01	0,3415E+06	0,6075E+01	0,3435E+06	0,6073E+01	186	3	2	241
0,3455E+06	0,6053E+01	0,3475E+06	0,6043E+01	0,3495E+06	0,6088E+01	186	3	2	242
0,3515E+06	0,6091E+01	0,3535E+06	0,6095E+01	0,3555E+06	0,6092E+01	186	3	2	243
0,3575E+06	0,6106E+01	0,3595E+06	0,6117E+01	0,3615E+06	0,6125E+01	186	3	2	244
0,3636E+06	0,6152E+01	0,3656E+06	0,6187E+01	0,3676E+06	0,6178E+01	186	3	2	245
0,3696E+06	0,6140E+01	0,3716E+06	0,6096E+01	0,3736E+06	0,6058E+01	186	3	2	246

APPENDIX: EXPERIMENTAL EVALUATED DATA SETS (Contd.)

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0.3756E+06	0.6050E+01	0.3776E+06	0.6043E+01	0.3796E+06	0.6013E+01	186	3	2	247
0.3816E+06	0.6010E+01	0.3836E+06	0.5987E+01	0.3866E+06	0.5947E+01	186	3	2	248
0.3876E+06	0.5939E+01	0.3896E+06	0.5896E+01	0.3916E+06	0.5881E+01	186	3	2	249
0.3936E+06	0.5873E+01	0.3956E+06	0.5875E+01	0.3976E+06	0.5838E+01	186	3	2	250
0.3989E+06	0.5852E+01	0.3996E+06	0.5860E+01	0.4000E+06	0.5857E+01	186	3	2	251
0.4016E+06	0.5843E+01	0.4046E+06	0.5836E+01	0.4056E+06	0.5836E+01	186	3	2	252
0.4076E+06	0.5808E+01	0.4096E+06	0.5826E+01	0.4116E+06	0.5827E+01	186	3	2	253
0.4136E+06	0.5834E+01	0.4156E+06	0.5809E+01	0.4176E+06	0.5832E+01	186	3	2	254
0.4196E+06	0.5826E+01	0.4226E+06	0.5802E+01	0.4236E+06	0.5787E+01	186	3	2	255
0.4256E+06	0.5797E+01	0.4276E+06	0.5795E+01	0.4296E+06	0.5791E+01	186	3	2	256
0.4316E+06	0.5797E+01	0.4336E+06	0.5789E+01	0.4356E+06	0.5776E+01	186	3	2	257
0.4376E+06	0.5789E+01	0.4406E+06	0.5779E+01	0.4416E+06	0.5781E+01	186	3	2	258
0.4436E+06	0.5764E+01	0.4456E+06	0.5729E+01	0.4476E+06	0.5723E+01	186	3	2	259
0.4505E+06	0.5708E+01	0.4524E+06	0.5660E+01	0.4542E+06	0.5661E+01	186	3	2	260
0.4560E+06	0.5640E+01	0.4587E+06	0.5601E+01	0.4596E+06	0.5581E+01	186	3	2	261
0.4615E+06	0.5560E+01	0.4633E+06	0.5561E+01	0.4651E+06	0.5566E+01	186	3	2	262
0.4669E+06	0.5543E+01	0.4688E+06	0.5539E+01	0.4696E+06	0.5508E+01	186	3	2	263
0.4716E+06	0.5496E+01	0.4736E+06	0.5481E+01	0.4765E+06	0.5486E+01	186	3	2	264
0.4783E+06	0.5478E+01	0.4802E+06	0.5482E+01	0.4820E+06	0.5482E+01	186	3	2	265
0.4838E+06	0.5467E+01	0.4856E+06	0.5430E+01	0.4884E+06	0.5403E+01	186	3	2	266
0.4902E+06	0.5408E+01	0.4918E+06	0.5402E+01	0.4935E+06	0.5393E+01	186	3	2	267
0.4952E+06	0.5386E+01	0.4961E+06	0.5371E+01	0.4979E+06	0.5369E+01	186	3	2	268
0.4997E+06	0.5346E+01	0.5000E+06	0.5344E+01	0.5015E+06	0.5335E+01	186	3	2	269
0.5034E+06	0.5310E+01	0.5061E+06	0.5271E+01	0.5080E+06	0.5280E+01	186	3	2	270
0.5088E+06	0.5276E+01	0.5107E+06	0.5286E+01	0.5127E+06	0.5300E+01	186	3	2	271
0.5147E+06	0.5293E+01	0.5174E+06	0.5290E+01	0.5192E+06	0.5275E+01	186	3	2	272
0.5211E+06	0.5241E+01	0.5229E+06	0.5230E+01	0.5247E+06	0.5245E+01	186	3	2	273
0.5256E+06	0.5267E+01	0.5275E+06	0.5273E+01	0.5293E+06	0.5262E+01	186	3	2	274
0.5311E+06	0.5201E+01	0.5329E+06	0.5159E+01	0.5347E+06	0.5143E+01	186	3	2	275
0.5357E+06	0.5117E+01	0.5377E+06	0.5103E+01	0.5406E+06	0.5113E+01	186	3	2	276
0.5433E+06	0.5142E+01	0.5451E+06	0.5130E+01	0.5470E+06	0.5116E+01	186	3	2	277
0.5488E+06	0.5115E+01	0.5500E+06	0.5123E+01	0.5506E+06	0.5127E+01	186	3	2	278
0.5525E+06	0.5156E+01	0.5543E+06	0.5166E+01	0.5561E+06	0.5163E+01	186	3	2	279
0.5580E+06	0.5163E+01	0.5588E+06	0.5167E+01	0.5615E+06	0.5173E+01	186	3	2	280
0.5625E+06	0.5171E+01	0.5643E+06	0.5167E+01	0.5661E+06	0.5191E+01	186	3	2	281
0.5679E+06	0.5218E+01	0.5697E+06	0.5254E+01	0.5715E+06	0.5222E+01	186	3	2	282
0.5734E+06	0.5220E+01	0.5752E+06	0.5217E+01	0.5780E+06	0.5224E+01	186	3	2	283
0.5797E+06	0.5211E+01	0.5815E+06	0.5201E+01	0.5833E+06	0.5198E+01	186	3	2	284
0.5851E+06	0.5199E+01	0.5870E+06	0.5181E+01	0.5888E+06	0.5140E+01	186	3	2	285
0.5906E+06	0.5113E+01	0.5925E+06	0.5120E+01	0.5943E+06	0.5110E+01	186	3	2	286
0.5961E+06	0.5095E+01	0.5970E+06	0.5092E+01	0.5988E+06	0.5074E+01	186	3	2	287
0.5997E+06	0.5077E+01	0.6000E+06	0.5077E+01	0.6017E+06	0.5072E+01	186	3	2	288
0.6037E+06	0.5037E+01	0.6057E+06	0.5051E+01	0.6077E+06	0.5044E+01	186	3	2	289
0.6097E+06	0.5060E+01	0.6117E+06	0.5050E+01	0.6137E+06	0.5051E+01	186	3	2	290
0.6157E+06	0.5038E+01	0.6177E+06	0.5030E+01	0.6207E+06	0.5008E+01	186	3	2	291
0.6225E+06	0.4999E+01	0.6243E+06	0.5003E+01	0.6262E+06	0.4960E+01	186	3	2	292
0.6280E+06	0.4954E+01	0.6307E+06	0.4966E+01	0.6326E+06	0.4962E+01	186	3	2	293
0.6344E+06	0.4955E+01	0.6362E+06	0.4939E+01	0.6381E+06	0.4918E+01	186	3	2	294
0.6389E+06	0.4919E+01	0.6398E+06	0.4917E+01	0.6408E+06	0.4914E+01	186	3	2	295
0.6418E+06	0.4907E+01	0.6428E+06	0.4916E+01	0.6500E+06	0.4915E+01	186	3	2	296
0.7000E+06	0.4929E+01	0.7417E+06	0.4907E+01	0.7500E+06	0.4875E+01	186	3	2	297
0.8000E+06	0.4682E+01	0.8500E+06	0.4563E+01	0.8664E+06	0.4529E+01	186	3	2	298
0.9000E+06	0.4309E+01	0.9500E+06	0.4212E+01	0.9577E+06	0.4203E+01	186	3	2	299
0.1000E+07	0.4059E+01	0.1028E+07	0.4045E+01	0.1050E+07	0.3968E+01	186	3	2	300
0.1100E+07	0.3812E+01	0.1150E+07	0.3784E+01	0.1182E+07	0.3773E+01	186	3	2	301
0.1200E+07	0.3735E+01	0.1250E+07	0.3737E+01	0.1296E+07	0.3742E+01	186	3	2	302

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0,1300E+07 0,3736E+01 0,1350E+07 0,3702E+01 0,1400E+07 0,3670E+01 186 3  2  303
0,1490E+07 0,3710E+01 0,1500E+07 0,3696E+01 0,1600E+07 0,3700E+01 186 3  2  304
0.1630E+07 0,3727E+01 0,1700E+07 0,3666E+01 0,1727E+07 0,3689E+01 186 3  2  305
0.1800E+07 0,3627E+01 0,1849E+07 0,3671E+01 0.1900E+07 0,3682E+01 186 3  2  306
0.1942E+07 0,3726E+01 0,2000E+07 0,3749E+01 0.2004E+07 0,3754E+01 186 3  2  307
0.2100E+07 0,3816E+01 0,2119E+07 0,3837E+01 0.2200E+07 0,3640E+01 186 3  2  308
0.2240E+07 0,3866E+01 0,2300E+07 0,3868E+01 0.2347E+07 0,3883E+01 186 3  2  309
0,2400E+07 0,3884E+01 0,2434E+07 0,3906E+01 0.2500E+07 0,3915E+01 186 3  2  310
0,2552E+07 0,3914E+01 0,2600E+07 0,3896E+01 0.2643E+07 0,3925E+01 186 3  2  311
0,2712E+07 0,3930E+01 0,2750E+07 0,3925E+01 0.2769E+07 0,3920E+01 186 3  2  312
0,2800E+07 0,3905E+01 0,2820E+07 0,3914E+01 0.2868E+07 0,3923E+01 186 3  2  313
0,2933E+07 0,3915E+01 0,2979E+07 0,3901E+01 0.3000E+07 0.3292E+01 186 3  2  314
0,3023E+07 0,3901E+01 0,3063E+07 0,3908E+01 0.3100E+07 0,3904E+01 186 3  2  315
0.3200E+07 0,3853E+01 0,3300E+07 0,3887E+01 0,3400E+07 0,3861E+01 186 3  2  316
0,3500E+07 0,3875E+01 0,3600E+07 0,3818E+01 0,3800E+07 0,3765E+01 186 3  2  317
0,4000E+07 0,3771E+01                                             186 3  2  318
                                                                  186 3  0  319
,74186E 05 ,18436E 03          0          99          0         0 186 3  4  320
0,0        -,12260E 06          0           0          1        76 186 3  4  321
        76          2                                             186 3  4  322
0,1233E+06 0,0000E-01 0,1250E+06 0,2400E+00 0,1500E+06 0,4300E+00 186 3  4  323
0,2000E+06 0,6600E+00 0,2500E+06 0,8250E+00 0,3000E+06 0,9800E+00 186 3  4  324
0,3989E+06 0,1158E+01 0,4000E+06 0,1160E+01 0,5000E+06 0,1390E+01 186 3  4  325
0,5500E+06 0,1472E+01 0,6000E+06 0,1550E+01 0,6500E+06 0,1617E+01 186 3  4  326
0,7000E+06 0,1665E+01 0,7417E+06 0,1684E+01 0,7500E+06 0,1716E+01 186 3  4  327
0,8000E+06 0,1907E+01 0,8500E+06 0,1990E+01 0,8664E+06 0,2012E+01 186 3  4  328
0,9000E+06 0,2208E+01 0,9500E+06 0,2301E+01 0,9577E+06 0,2309E+01 186 3  4  329
0,1000E+07 0,2450E+01 0,1028E+07 0,2475E+01 0,1050E+07 0,2559E+01 186 3  4  330
0,1100E+07 0,2735E+01 0,1150E+07 0,2782E+01 0,1132E+07 0,2805E+01 186 3  4  331
0,1200E+07 0,2850E+01 0,1250E+07 0,2868E+01 0,1296E+07 0,2880E+01 186 3  4  332
0,1300E+07 0,2887E+01 0,1350E+07 0,2939E+01 0,1400E+07 0,2991E+01 186 3  4  333
0,1490E+07 0,2999E+01 0,1500E+07 0,3018E+01 0,1600E+07 0,3066E+01 186 3  4  334
0,1630E+07 0,3054E+01 0,1700E+07 0,3149E+01 0,1727E+07 0,3143E+01 186 3  4  335
0,1800E+07 0,3242E+01 0,1849E+07 0,3228E+01 0,1900E+07 0,3248E+01 186 3  4  336
0,1942E+07 0,3230E+01 0,2000E+07 0,3243E+01 0,2004E+07 0,3240E+01 186 3  4  337
0,2100E+07 0,3227E+01 0,2119E+07 0,3217E+01 0,2200E+07 0,3255E+01 186 3  4  338
0,2240E+07 0,3245E+01 0,2300E+07 0,3268E+01 0,2347E+07 0,3273E+01 186 3  4  339
0,2400E+07 0,3294E+01 0,2434E+07 0,3269E+01 0,2500E+07 0,3254E+01 186 3  4  340
0,2552E+07 0,3250E+01 0,2600E+07 0,3264E+01 0,2643E+07 0,3222E+01 186 3  4  341
0,2712E+07 0,3196E+01 0,2750E+07 0,3191E+01 0,2769E+07 0,3190E+01 186 3  4  342
0,2800E+07 0,3196E+01 0,2820E+07 0,3178E+01 0,2868E+07 0,3148E+01 186 3  4  343
0,2933E+07 0,3127E+01 0,2979E+07 0,3120E+01 0,3000E+07 0,3121E+01 186 3  4  344
0,3023E+07 0,3101E+01 0,3063E+07 0,3076E+01 0,3100E+07 0,3063E+01 186 3  4  345
0,3200E+07 0,3069E+01 0,3300E+07 0,2990E+01 0,3400E+07 0,2971E+01 186 3  4  346
0,3500E+07 0,2912E+01 0,3600E+07 0,2912E+01 0,3300E+07 0,2851E+01 186 3  4  347
0,4000E+07 0,2731E+01 0,2514E+06 0,3121E+00 0,2544E+06 0,2115E+00 186 3  4  348
                                                                  186 3  0  349
,74186E 05 ,18436E 03          0           1          0         0 186 3 51  350
0,0        -,12260E 06          0           0          1        26 186 3 51  351
        26          2                                             186 3 51  352
0,1233E+06 0,0000E-01 0,1250E+06 0,2400E+00 0,1500E+06 0,4300E+00 186 3 51  353
0,2000E+06 0,6600E+00 0,2500E+06 0,8250E+00 0,3000E+06 0,9800E+00 186 3 51  354
0,4000E+06 0,1160E+01 0,5000E+06 0,1350E+01 0,5500E+06 0,1405E+01 186 3 51  355
0,6000E+06 0,1455E+01 0,6500E+06 0,1495E+01 0,7000E+06 0,1515E+01 186 3 51  356
0,7500E+06 0,1518E+01 0,8000E+06 0,1517E+01 0,8500E+06 0,1490E+01 186 3 51  357
0,9000E+06 0,1448E+01 0,1000E+07 0,1375E+01 0,1200E+07 0,1190E+01 186 3 51  358
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APPENDIX: EXPERIMENTAL EVALUATED DATA SETS (Contd.)

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0.1400E+07 0.1035E+01 0.1600E+07 0.9200E+00 0.1800E+07 0.8380E+00 186 3 51  359
0.2000E+07 0.7700E+00 0.2500E+07 0.6200E+00 0.3000E+07 0.4900E+00 186 3 51  360
0.3500E+07 0.4050E+00 0.4000E+07 0.3650E+00 0.0000E-01 0.0000E-01 186 3 51  361
                                                                  186 3  0  362
.74186E 05 .18436E 03          0          2          0          0 186 3 52  363
0.0       -.39670E 06          0          0          1         18 186 3 52  364
        18          2                                             186 3 52  365
0.3989E+06 0.0000E-01 0.5000E+06 0.4000E-01 0.6000E+06 0.9500E-01 186 3 52  366
0.7000E+06 0.1500E+00 0.8000E+06 0.1900E+00 0.9000E+06 0.2200E+00 186 3 52  367
0.1000E+07 0.2400E+00 0.1100E+07 0.2500E+00 0.1200E+07 0.2550E+00 186 3 52  368
0.1300E+07 0.2500E+00 0.1400E+07 0.2450E+00 0.1600E+07 0.2280E+00 186 3 52  369
0.1800E+07 0.2050E+00 0.2000E+07 0.1800E+00 0.2500E+07 0.1150E+00 186 3 52  370
0.3000E+07 0.6800E-01 0.3500E+07 0.4800E-01 0.4000E+07 0.3200E-01 186 3 52  371
                                                                  186 3  0  372
.74186E 05 .18436E 03          0          3          0          0 186 3 53  373
0.0       -.73770E 06          0          0          1         18 186 3 53  374
        18          2                                             186 3 53  375
0.7417E+06 0.0000E-01 0.8000E+06 0.2000E+00 0.9000E+06 0.3900E+00 186 3 53  376
0.9500E+06 0.4300E+00 0.1000E+07 0.4500E+00 0.1050E+07 0.4550E+00 186 3 53  377
0.1100E+07 0.4520E+00 0.1200E+07 0.4420E+00 0.1300E+07 0.4200E+00 186 3 53  378
0.1400E+07 0.3860E+00 0.1600E+07 0.3300E+00 0.1800E+07 0.2820E+00 186 3 53  379
0.2000E+07 0.2350E+00 0.2500E+07 0.1250E+00 0.2750E+07 0.8500E-01 186 3 53  380
0.3000E+07 0.6100E-01 0.3500E+07 0.4000E-01 0.4000E+07 0.3500E-01 186 3 53  381
                                                                  186 3  0  382
.74186E 05 .18436E 03          0          4          0          0 186 3 54  383
0.0       -.86180E 06          0          0          1         23 186 3 54  384
        23          2                                             186 3 54  385
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0.1000E+07 0.2850E+00 0.1050E+07 0.3220E+00 0.1100E+07 0.3520E+00 186 3 54  387
0.1150E+07 0.3680E+00 0.1200E+07 0.3730E+00 0.1250E+07 0.3780E+00 186 3 54  388
0.1300E+07 0.3780E+00 0.1350E+07 0.3720E+00 0.1400E+07 0.3650E+00 186 3 54  389
0.1600E+07 0.3250E+00 0.1700E+07 0.3020E+00 0.1800E+07 0.2780E+00 186 3 54  390
0.2000E+07 0.2300E+00 0.2200E+07 0.1890E+00 0.2400E+07 0.1520E+00 186 3 54  391
0.2600E+07 0.1120E+00 0.2800E+07 0.8500E-01 0.3000E+07 0.6300E-01 186 3 54  392
0.3500E+07 0.3500E-01 0.4000E+07 0.2200E-01                       186 3 54  393
                                                                  186 3  0  394
.74186E 05 .18436E 03          0          5          0          0 186 3 55  395
0.0       -.95258E 06          0          0          1         15 186 3 55  396
        15          2                                             186 3 55  397
0.9577E+06 0.0000E-01 0.1000E+07 0.1000E+00 0.1100E+07 0.1880E+00 186 3 55  398
0.1200E+07 0.2280E+00 0.1300E+07 0.2500E+00 0.1400E+07 0.2600E+00 186 3 55  399
0.1500E+07 0.2680E+00 0.1600E+07 0.2670E+00 0.1700E+07 0.2570E+00 186 3 55  400
0.1800E+07 0.2390E+00 0.2000E+07 0.2000E+00 0.2500E+07 0.9600E-01 186 3 55  401
0.3000E+07 0.4700E-01 0.3500E+07 0.2600E-01 0.4000E+07 0.2000E-01 186 3 55  402
                                                                  186 3  0  403
.74186E 05 .18436E 03          0          6          0          0 186 3 56  404
0.0       -.10225E 07          0          0          1         18 186 3 56  405
        18          2                                             186 3 56  406
0.1028E+07 0.0000E-01 0.1100E+07 0.2100E+00 0.1200E+07 0.3300E+00 186 3 56  407
0.1300E+07 0.3900E+00 0.1400E+07 0.4300E+00 0.1500E+07 0.4550E+00 186 3 56  408
0.1600E+07 0.4690E+00 0.1700E+07 0.4750E+00 0.1800E+07 0.4600E+00 186 3 56  409
0.1900E+07 0.4200E+00 0.2000E+07 0.3870E+00 0.2200E+07 0.3190E+00 186 3 56  410
0.2400E+07 0.2550E+00 0.2600E+07 0.2000E+00 0.2800E+07 0.1400E+00 186 3 56  411
0.3000E+07 0.1060E+00 0.3500E+07 0.3000E-01 0.4000E+07 0.2000E-01 186 3 56  412
                                                                  186 3  0  413
.74186E 05 .18436E 03          0          7          0          0 186 3 57  414
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APPENDIX: EXPERIMENTAL EVALUATED DATA SETS (Contd.)

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```
0,0        -,11756E 07          0          0          1         14 186 3 57   415
     14          2                                                 186 3 57   416
0.1182E+07 0,0000E-01 0,1200E+07 0.3150E-01 0.1300E+07 0,8010E-01 186 3 57   417
0.1400E+07 0,1080E+00 0,1500E+07 0.1260E+00 0.1600E+07 0,1413E+00 186 3 57   418
0.1700E+07 0,1440E+00 0,1800E+07 0.1436E+00 0.1900E+07 0.1391E+00 186 3 57   419
0.2000E+07 0,1350E+00 0,2500E+07 0,9900E-01 0.3000E+07 0,6300E-01 186 3 57   420
0,3500E+07 0,3150E-01 0,4000E+07 0,1600E-01                       186 3 57   421
                                                                   186 3  0   422
,74186E 05 ,18436E 03          0          8          0          0 186 3 58   423
0,0        -,12891E 07          0          0          1         13 186 3 58   424
     13          2                                                 186 3 58   425
0.1296E+07 0,0000E-01 0,1400E+07 0.1620E+00 0.1500E+07 0,2340E+00 186 3 58   426
0,1600E+07 0,2700E+00 0,1700E+07 0,2880E+00 0,1800E+07 0,2925E+00 186 3 58   427
0.1900E+07 0,2862E+00 0,2000E+07 0.2745E+00 0.2200E+07 0.2160E+00 186 3 58   428
0.2500E+07 0,1305E+00 0,3000E+07 0,7920E-01 0.3500E+07 0,3600E-01 186 3 58   429
0,4000E+07 0,1890E-01 0,4000E+07 0,1800E-01                       186 3 58   430
                                                                   186 3  0   431
,74186E 05 ,18436E 03          0          9          0          0 186 3 59   432
0.0        -,14820E 07          0          0          1         17 186 3 59   433
     17          2                                                 186 3 59   434
0.1490E+07 0,0000E-01 0,1500E+07 0.1800E-01 0.1600E+07 0,1152E+00 186 3 59   435
0.1700E+07 0,1602E+00 0,1800E+07 0.1962E+00 0.1900E+07 0,2250E+00 186 3 59   436
0,2000E+07 0,2412E+00 0,2100E+07 0.2511E+00 0,2200E+07 0,2529E+00 186 3 59   437
0,2300E+07 0,2529E+00 0,2400E+07 0.2511E+00 0.2500E+07 0,2430E+00 186 3 59   438
0,2600E+07 0,2268E+00 0,2800E+07 0,1890E+00 0,3000E+07 0,1539E+00 186 3 59   439
0,3500E+07 0,6750E-01 0,4000E+07 0,1800E-01                       186 3 59   440
                                                                   186 3  0   441
,74186E 05 ,18436E 03          0         10          0          0 186 3 60   442
0.0        -,16212E 07          0          0          1         15 186 3 60   443
     15          2                                                 186 3 60   444
0.1630E+07 0,0000E-01 0,1700E+07 0.1215E+00 0.1800E+07 0,1908E+00 186 3 60   445
0.1900E+07 0,2349E+00 0,2000E+07 0,2637E+00 0.2100E+07 0,2799E+00 186 3 60   446
0,2200E+07 0,2916E+00 0,2300E+07 0,2935E+00 0.2400E+07 0,2916E+00 186 3 60   447
0,2500E+07 0,2835E+00 0,2600E+07 0,2673E+00 0.2800E+07 0,2394E+00 186 3 60   448
0,3000E+07 0,1980E+00 0,3500E+07 0,9000E-01 0.4000E+07 0,3600E-01 186 3 60   449
                                                                   186 3  0   450
,74186E 05 ,18436E 03          0         11          0          0 186 3 61   451
0,0        -,17177E 07          0          0          1         14 186 3 61   452
     14          2                                                 186 3 61   453
0.1727E+07 0,0000E-01 0,1800E+07 0,1170E+00 0,1900E+07 0,1800E+00 186 3 61   454
0,2000E+07 0,2160E+00 0,2100E+07 0,2385E+00 0.2200E+07 0,2493E+00 186 3 61   455
0.2300E+07 0,2520E+00 0,2400E+07 0,2511E+00 0.2500E+07 0,2430E+00 186 3 61   456
0,2600E+07 0,2232E+00 0,2800E+07 0,1755E+00 0,3000E+07 0,1305E+00 186 3 61   457
0,3500E+07 0,5400E-01 0,4000E+07 0,2250E-01                       186 3 61   458
                                                                   186 3  0   459
,74186E 05 ,18436E 03          0         12          0          0 186 3 62   460
0,0        -,18391E 07          0          0          1         11 186 3 62   461
     11          2                                                 186 3 62   462
0,1849E+07 0,0000E-01 0,1900E+07 0,3420E-01 0.2000E+07 0,7290E-01 186 3 62   463
0,2100E+07 0,9450E-01 0,2200E+07 0,1080E+00 0.2300E+07 0,1170E+00 186 3 62   464
0,2400E+07 0,1179E+00 0,2500E+07 0,1170E+00 0.3000E+07 0,1017E+00 186 3 62   465
0,3500E+07 0,7650E-01 0,4000E+07 0,6300E-01                       186 3 62   466
                                                                   186 3  0   467
,74186E 05 ,18436E 03          0         13          0          0 186 3 63   468
0.0        -,19316E 07          0          0          1         12 186 3 63   469
     12          2                                                 186 3 63   470
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APPENDIX: EXPERIMENTAL EVALUATED DATA SETS (Contd.)

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0.1942E+07 0.0000E-01 0.2000E+07 0.3780E-01 0.2100E+07 0.6750E-01 186 3 63  471
0.2200E+07 0.8550E-01 0.2300E+07 0.9900E-01 0.2400E+07 0.1017E+00 186 3 63  472
0.2500E+07 0.1035E+00 0.2600E+07 0.1053E+00 0.2800E+07 0.1035E+00 186 3 63  473
0.3000E+07 0.9450E-01 0.3500E+07 0.6030E-01 0.4000E+07 0.3420E-01 186 3 63  474
                                                                  186 3  0  475
.74186E 05 .18436E 03          0          14          0          0 186 3 64  476
0.0          -.19932E 07       0           0          1          8 186 3 64  477
         8          2
0.2004E+07 0.0000E-01 0.2200E+07 0.1250E+00 0.2400E+07 0.1750E+00 186 3 64  478
0.2600E+07 0.2000E+00 0.2800E+07 0.2050E+00 0.3000E+07 0.1900E+00 186 3 64  479
0.3500E+07 0.1100E+00 0.4000E+07 0.6000E-01                       186 3 64  480
                                                                  186 3 64  481
.74186E 05 .18436E 03          0          15          0           186 3  0  482
0.0          -.21076E 07       0           0          1          0 186 3 65  483
         8          2                                            8 186 3 65  484
0.2119E+07 0.0000E-01 0.2200E+07 0.8500E-01 0.2400E+07 0.1750E+00 186 3 65  485
0.2600E+07 0.1900E+00 0.2800E+07 0.1820E+00 0.3000E+07 0.1580E+00 186 3 65  486
0.3500E+07 0.8700E-01 0.4000E+07 0.5500E-01                       186 3 65  487
                                                                  186 3 65  488
.74186E 05 .18436E 03          0          16          0           186 3  0  489
0.0          -.22280E 07       0           0          1          0 186 3 66  490
         7          2                                            7 186 3 66  491
0.2240E+07 0.0000E-01 0.2400E+07 0.1000E-00 0.2600E+07 0.1500E+00 186 3 66  492
0.2800E+07 0.1620E+00 0.3000E+07 0.1580E+00 0.3500E+07 0.1050E+00 186 3 66  493
0.4000E+07 0.6800E-01                                             186 3 66  494
                                                                  186 3 66  495
.74186E 05 .18436E 03          0          17          0           186 3  0  496
0.0          -.23344E 07       0           0          1          0 186 3 67  497
         6          2                                            6 186 3 67  498
0.2347E+07 0.0000E-01 0.2600E+07 0.8000E-01 0.2800E+07 0.9500E-01 186 3 67  499
0.3000E+07 0.1000E-00 0.3500E+07 0.9500E-01 0.4000E+07 0.8700E-01 186 3 67  500
                                                                  186 3 67  501
.74186E 05 .18436E 03          0          18          0           186 3  0  502
0.0          -.24209E 07       0           0          1          0 186 3 68  503
         6          2                                            6 186 3 68  504
0.2434E+07 0.0000E-01 0.2600E+07 0.9000E-01 0.2800E+07 0.1400E+00 186 3 68  505
0.3000E+07 0.1430E+00 0.3500E+07 0.1320E+00 0.4000E+07 0.1100E+00 186 3 68  506
                                                                  186 3 68  507
.74186E 05 .18436E 03          0          19          0           186 3  0  508
0.0          -.25383E 07       0           0          1          0 186 3 69  509
         5          2                                            5 186 3 69  510
0.2552E+07 0.0000E-01 0.2800E+07 0.9500E-01 0.3000E+07 0.1150E+00 186 3 69  511
0.3500E+07 0.1050E+00 0.4000E+07 0.9500E-01                       186 3 69  512
                                                                  186 3 69  513
.74186E 05 .18436E 03          0          20          0           186 3  0  514
0.0          -.26288E 07       0           0          1          0 186 3 70  515
         6          2                                            6 186 3 70  516
0.2643E+07 0.0000E-01 0.2800E+07 0.9500E-01 0.3000E+07 0.1650E+00 186 3 70  517
0.3200E+07 0.1700E+00 0.3500E+07 0.1600E+00 0.4000E+07 0.1400E+00 186 3 70  518
                                                                  186 3 70  519
.74186E 05 .18436E 03          0          21          0           186 3  0  520
0.0          -.26975E 07       0           0          1          0 186 3 71  521
         5          2                                            5 186 3 71  522
0.2712E+07 0.0000E-01 0.3000E+07 0.7000E-01 0.3200E+07 0.9000E-01 186 3 71  523
0.3500E+07 0.8000E-01 0.4000E+07 0.7000E-01                       186 3 71  524
                                                                  186 3 71  525
                                                                  186 3  0  526
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APPENDIX: EXPERIMENTAL EVALUATED DATA SETS (Contd.)

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```
.74186E 05 .18436E 03          0          22           0           0 186 3 72   527
0.0        -.27542E 07          0           0           1           5 186 3 72   528
         5          2                                                 186 3 72   529
0.2769E+07 0.0000E-01 0.3000E+07 0.6000E-01 0.3200E+07 0.8500E-01 186 3 72   530
0.3500E+07 0.8000E-01 0.4000E+07 0.7000E-01                       186 3 72   531
                                                                  186 3  0   532
.74186E 05 .18436E 03          0          23           0           0 186 3 73   533
0.0        -.28049E 07          0           0           1           5 186 3 73   534
         5          2                                                 186 3 73   535
0.2820E+07 0.0000E-01 0.3000E+07 0.5000E-01 0.3200E+07 0.8400E-01 186 3 73   536
0.3500E+07 0.8000E-01 0.4000E+07 0.7600E-01                       186 3 73   537
                                                                  186 3  0   538
.74186E 05 .18436E 03          0          24           0           0 186 3 74   539
0.0        -.28527E 07          0           0           1           5 186 3 74   540
         5          2                                                 186 3 74   541
0.2868E+07 0.0000E-01 0.3000E+07 0.4000E-01 0.3200E+07 0.6500E-01 186 3 74   542
0.3500E+07 0.6300E-01 0.4000E+07 0.6000E-01                       186 3 74   543
                                                                  186 3  0   544
.74186E 05 .18436E 03          0          25           0           0 186 3 75   545
0.0        -.29173E 07          0           0           1           4 186 3 75   546
         4          2                                                 186 3 75   547
0.2933E+07 0.0000E-01 0.3200E+07 0.5000E-01 0.3500E+07 0.7000E-01 186 3 75   548
0.4000E+07 0.7000E-01                                             186 3 75   549
                                                                  186 3  0   550
.74186E 05 .18436E 03          0          26           0           0 186 3 76   551
0.0        -.29631E 07          0           0           1           4 186 3 76   552
         4          2                                                 186 3 76   553
0.2979E+07 0.0000E-01 0.3200E+07 0.4000E-01 0.3500E+07 0.6000E-01 186 3 76   554
0.4000E+07 0.6000E-01                                             186 3 76   555
                                                                  186 3  0   556
.74186E 05 .18436E 03          0          27           0           0 186 3 77   557
0.0        -.30068E 07          0           0           1           4 186 3 77   558
         4          2                                                 186 3 77   559
0.3023E+07 0.0000E-01 0.3200E+07 0.4000E-01 0.3500E+07 0.6500E-01 186 3 77   560
0.4000E+07 0.6500E-01                                             186 3 77   561
                                                                  186 3  0   562
.74186E 05 .18436E 03          0          28           0           0 186 3 78   563
0.0        -.30466E 07          0           0           1           4 186 3 78   564
         4          2                                                 186 3 78   565
0.3063E+07 0.0000E-01 0.3200E+07 0.4000E-01 0.3500E+07 0.6000E-01 186 3 78   566
0.4000E+07 0.6000E-01                                             186 3 78   567
                                                                  186 3  0   568
.74186E 05 .18436E 03          0          99           0           0 186 3 91   569
0.0        -.21882E 07          0           0           1          12 186 3 91   570
        12          2                                                 186 3 91   571
0.2200E+07 0.0000E-01 0.2400E+07 0.1000E-00 0.2600E+07 0.1800E+00 186 3 91   572
0.2800E+07 0.2000E+00 0.3000E+07 0.2000E+00 0.3100E+07 0.2000E+00 186 3 91   573
0.3200E+07 0.2400E+00 0.3300E+07 0.3200E+00 0.3400E+07 0.4600E+00 186 3 91   574
0.3600E+07 0.6600E+00 0.3800E+07 0.8000E+00 0.4000E+07 0.8800E+00 186 3 91   575
                                                                  186 3  0   576
.74186E 05 .18436E 03          0          99           0           0 186 3102   577
0.0        0.0                  0           0           1          18 186 3102   578
        18          2                                                 186 3102   579
0.1000E+06 0.2000E+00 0.1233E+06 0.1950E+00 0.1500E+06 0.1120E+00 186 3102   580
0.1750E+06 0.9000E-01 0.2000E+06 0.8200E-01 0.3000E+06 0.6800E-01 186 3102   581
0.4000E+06 0.6500E-01 0.5000E+06 0.6100E-01 0.6000E+06 0.6050E-01 186 3102   582
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APPENDIX: EXPERIMENTAL EVALUATED DATA SETS (Contd.)

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 0.7000E+06 0,6000E-01 0,8000E+06 0.5900E-01 0.9000E+06 0,5700E-01 186 3102  583
 0.1000E+07 0,5100E-01 0,1500E+07 0.3600E-01 0.2000E+07 0.2800E-01 186 3102  584
 0.2500E+07 0,2100E-01 0,3000E+07 0.1750E-01 0.4000E+07 0,8000E-02 186 3102  585
                                                                  186 3  0  586
 .74186E 05 .18436E 03                                            186 0  0  587
 0.0        .18436E 03          0          1          0          0 186 4  2  588
         14          2          0          1          1         14 186 4  2  589
 .00000E 00 .10000E-04                                            186 4  2  590
 .33333E-05 .00000E 00          0          0          1          0 186 4  2  591
 .00000E 00 .10000E 06 .00000E 00 .00000E 00 .00000E 00 .00000E 00 186 4  2  592
 .40000E-01 .80000E-02          0          0          2          0 186 4  2  593
 .00000E 00 .20000E 06 .00000E 00 .00000E 00 .00000E 00 .00000E 00 186 4  2  594
 .12667E 00 .32000E-01          0          0          4          0 186 4  2  595
 .00000E 00 .40000E 06 .42857E-02 .11111E-03 .00000E 00 .00000E 00 186 4  2  596
 .28333E 00 .11800E 00          0          0          4          0 186 4  2  597
 .00000E 00 .60000E 06 .27143E-01 .22222E-02 .00000E 00 .00000E 00 186 4  2  598
 .37333E 00 .20000E 00          0          0          4          0 186 4  2  599
 .00000E 00 .80000E 06 .60000E-01 .10556E-01 .00000E 00 .00000E 00 186 4  2  600
 .43000E 00 .26000E 00          0          0          6          0 186 4  2  601
 .00000E 00 .10000E 07 .10000E 00 .12778E-01 .45455E-03 .76923E-05 186 4  2  602
 .45000E 00 .31200E 00          0          0          6          0 186 4  2  603
 .00000E 00 .14000E 07 .14714E 00 .44444E-01 .90909E-03 .76923E-04 186 4  2  604
 .56667E 00 .39600E 00          0          0          6          0 186 4  2  605
 .00000E 00 .18000E 07 .23714E 00 .92222E-01 .10000E-01 .15385E-02 186 4  2  606
 .64667E 00 .46800E 00          0          0          8          0 186 4  2  607
 .13333E-02 .58824E-04 .31714E 00 .14889E 00 .35455E-01 .10385E-01 186 4  2  608
 .00000E 00 .22000E 07 .00000E 00 .00000E 00 .00000E 00 .00000E 00 186 4  2  609
 .72000E 00 .53200E 00          0          0          8          0 186 4  2  610
 .50000E-02 .11765E-02 .37857E 00 .20222E 00 .67727E-01 .24615E-01 186 4  2  611
 .00000E 00 .26000E 07 .00000E 00 .00000E 00 .00000E 00 .00000E 00 186 4  2  612
 .76000E 00 .59600E 00          0          0          8          0 186 4  2  613
 .76000E-02 .17647E-03 .43000E 00 .25778E 00 .10636E 00 .38231E-01 186 4  2  614
 0.0000E-01 0,3000E+07 .00000E 00 .00000E 00 .00000E 00 .00000E 00 186 4  2  615
 0,7967E+00 0,6200E+00          0          0         10          0 186 4  2  616
 0,1893E-01 0,5999E-02 0.4443E+00 0,2867E+00 0.1309E+00 0,5384E-01 186 4  2  617
 0.0000E-01 0,3500E+07-0,9283E-07 0,1830E-06 0.0000E-01 0,0000E-01 186 4  2  618
 0.6267E+00 0.6600E+00          0          0         12          0 186 4  2  619
 0,2426E-01 0,5711E-02 0,4843E+00 0,3267E+00 0.1691E+00 0,7315E-01 186 4  2  620
 0.0000E-01 0,4000E+07-0,3841E-06 0.1340E-07-0.1746E-06 0,1266E-06 186 4  2  621
 0.6167E+00 0,6660E+00          0          0         12          0 186 4  2  622
 0.4013E-01 0,1035E-01 0,5086E+00 0.3589E+00 0.1991E+00 0,9692E-01 186 4  2  623
                      -0,2172E-06-0,7246E-06-0,5153E-06 0,2937E-06 186 4  2  624
 .74186E 05 .18436E 03                                            186 4  0  625
 0.0        .18436E 03          0          1          0          0 186 4 51  626
         15          2          0          1          1         15 186 4 51  627
 .00000E 00 .12321E 06                                            186 4 51  628
 .00000E 00 .00000E 00          0          0          0          0 186 4 51  629
 .00000E 00 .20000E 06 .00000E 00 .00000E 00 .00000E 00 .00000E 00 186 4 51  630
 .33333E-02 .20000E-03          0          0          2          0 186 4 51  631
 .00000E 00 .40000E 06 .00000E 00 .00000E 00 .00000E 00 .00000E 00 186 4 51  632
 .10000E-01-.30000E-02          0          0          4          0 186 4 51  633
 .00000E 00 .60000E 06 .14286E-02 .11111E-03 .00000E 00 .00000E 00 186 4 51  634
 .20000E-01-.10000E-01          0          0          4          0 186 4 51  635
 .00000E 00 .80000E 06 .54286E-02 .11111E-03 .00000E 00 .00000E 00 186 4 51  636
 .29333E-01-.15000E-01          0          0          4          0 186 4 51  637
                       .92857E-02 .11111E-03 .00000E 00 .00000E 00 186 4 51  638
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APPENDIX: EXPERIMENTAL EVALUATED DATA SETS (Contd.)

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.00000E 00 .10000E 07          0          0          4          0 186 4 51  639
.43333E-01-.16000E-01 .13571E-01 .11111E-03 .00000E 00 .00000E 00 186 4 51  640
.00000E 00 .12000E 07          0          0          4          0 186 4 51  641
.56667E-01-.16000E-01 .20714E-01 .11111E-02 .00000E 00 .00000E 00 186 4 51  642
.00000E 00 .14000E 07          0          0          4          0 186 4 51  643
.68333E-01-.13000E-01 .27143E-01 .18889E-02 .00000E 00 .00000E 00 186 4 51  644
.00000E 00 .16000E 07          0          0          6          0 186 4 51  645
.55000E-01-.10000E-01 .34286E-01 .27778E-02 .27273E-02 .11538E-02 186 4 51  646
.00000E 00 .18000E 07          0          0          6          0 186 4 51  647
.10333E 00-.50000E-02 .41143E-01 .42222E-02 .36364E-02 .23077E-02 186 4 51  648
.00000E 00 .20000E 07          0          0          6          0 186 4 51  649
.12000E 00 .20000E-03 .47143E-01 .58889E-02 .46364E-02 .26923E-02 186 4 51  650
.00000E 00 .25000E 07          0          0          6          0 186 4 51  651
.16033E 00 .16000E-01 .60000E-01 .11111E-01 .72727E-02 .11538E-02 186 4 51  652
.00000E 00 .30000E 07          0          0          8          0 186 4 51  653
.20833E 00 .44000E-01 .74286E-01 .21111E-01 .90909E-02-.42308E-02 186 4 51  654
.16667E-02 .58624E-03 .00000E 00 .00000E 00 .00000E 00 .00000E 00 186 4 51  655
.00000E 00 .35000E 07          0          0          8          0 186 4 51  656
.23333E 00 .70000E-01 .90000E-01 .36667E-01 .11818E-01-.84615E-02 186 4 51  657
.30000E-02 .11765E-02 .00000E 00 .00000E 00 .00000E 00 .00000E 00 186 4 51  658
.00000E 00 .40000E 07          0          0          8          0 186 4 51  659
.25000E 00 .10000E 00 .88571E-01 .53333E-01 .15455E-01-.13077E-01 186 4 51  660
.40000E-02 .14706E-02 .00000E 00 .00000E 00 .00000E 00 .00000E 00 186 4 51  661
                                                                  186 4  0  662
.74186E 05 .18436E 03          0          1          0          0 186 4 52  663
0.0        .18436E 03          0          1          1          9 186 4 52  664
         9          2                                             186 4 52  665
.00000E 00 .39812E 06          0          0          0          0 186 4 52  666
.00000E 00 .00000E 00 .00000E 00 .00000E 00 .00000E 00 .00000E 00 186 4 52  667
.00000E 00 .50000E 06          0          0          2          0 186 4 52  668
.33333E-03-.10000E-02 .00000E 00 .00000E 00 .00000E 00 .00000E 00 186 4 52  669
.00000E 00 .10000E 07          0          0          2          0 186 4 52  670
.33333E-02-.20000E-02 .00000E 00 .00000E 00 .00000E 00 .00000E 00 186 4 52  671
.00000E 00 .15000E 07          0          0          2          0 186 4 52  672
.66667E-02-.50000E-02 .00000E 00 .00000E 00 .00000E 00 .00000E 00 186 4 52  673
.00000E 00 .20000E 07          0          0          4          0 186 4 52  674
.13333E-01-.16000E-01 .14286E-02 .11111E-03 .00000E 00 .00000E 00 186 4 52  675
.00000E 00 .25000E 07          0          0          4          0 186 4 52  676
.33333E-01-.22000E-01 .35714E-02 .11111E-02 .00000E 00 .00000E 00 186 4 52  677
.00000E 00 .30000E 07          0          0          4          0 186 4 52  678
.65000E-01-.15000E-01 .10714E-01 .24444E-02 .00000E 00 .00000E 00 186 4 52  679
.00000E 00 .35000E 07          0          0          4          0 186 4 52  680
.11333E 00-.20000E-02 .19286E-01 .50000E-02 .00000E 00 .00000E 00 186 4 52  681
.00000E 00 .40000E 07          0          0          4          0 186 4 52  682
.16333E 00-.80000E-02 .28571E-01 .83333E-02 .00000E 00 .00000E 00 186 4 52  683
                                                                  186 4  0  684
.74186E 05 .18436E 03          0          0          0          0 186 4 53  685
0.0        .18436E 03          1          1          0          0 186 4 53  686
                                                                  186 4  0  687
.74186E 05 .18436E 03          0          0          0          0 186 4 54  688
0.0        .18436E 03          1          1          0          0 186 4 54  689
                                                                  186 4  0  690
.74186E 05 .18436E 03          0          0          0          0 186 4 55  691
0.0        .18436E 03          1          1          0          0 186 4 55  692
                                                                  186 4  0  693
.74186E 05 .18436E 03          0          0          0          0 186 4 56  694
```

APPENDIX: EXPERIMENTAL EVALUATED DATA SETS (Contd.)

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0.0	.18436E 03	1	1	0	0	186	4	56	695
						186	4	0	696
.74186E 05	.18436E 03	0	0	0	0	186	4	57	697
0.0	.18436E 03	1	1	0	0	186	4	57	698
						186	4	0	699
.74186E 05	.18436E 03	0	0	0	0	186	4	58	700
0.0	.18436E 03	1	1	0	0	186	4	58	701
						186	4	0	702
.74186E 05	.18436E 03	0	0	0	0	186	4	59	703
0.0	.18436E 03	1	1	0	0	186	4	59	704
						186	4	0	705
.74186E 05	.18436E 03	0	0	0	0	186	4	60	706
0.0	.18436E 03	1	1	0	0	186	4	60	707
						186	4	0	708
.74186E 05	.18436E 03	0	0	0	0	186	4	61	709
0.0	.18436E 03	1	1	0	0	186	4	61	710
						186	4	0	711
.74186E 05	.18436E 03	0	0	0	0	186	4	62	712
0.0	.18436E 03	1	1	0	0	186	4	62	713
						186	4	0	714
.74186E 05	.18436E 03	0	0	0	0	186	4	63	715
0.0	.18436E 03	1	1	0	0	186	4	63	716
						186	4	0	717
.74186E 05	.18436E 03	0	0	0	0	186	4	64	718
0.0	.18436E 03	1	1	0	0	186	4	64	719
						186	4	0	720
.74186E 05	.18436E 03	0	0	0	0	186	4	65	721
0.0	.18436E 03	1	1	0	0	186	4	65	722
						186	4	0	723
.74186E 05	.18436E 03	0	0	0	0	186	4	66	724
0.0	.18436E 03	1	1	0	0	186	4	66	725
						186	4	0	726
.74186E 05	.18436E 03	0	0	0	0	186	4	67	727
0.0	.18436E 03	1	1	0	0	186	4	67	728
						186	4	0	729
.74186E 05	.18436E 03	0	0	0	0	186	4	68	730
0.0	.18436E 03	1	1	0	0	186	4	68	731
						186	4	0	732
.74186E 05	.18436E 03	0	0	0	0	186	4	69	733
0.0	.18436E 03	1	1	0	0	186	4	69	734
						186	4	0	735
.74186E 05	.18436E 03	0	0	0	0	186	4	70	736
0.0	.18436E 03	1	1	0	0	186	4	70	737
						186	4	0	738
.74186E 05	.18436E 03	0	0	0	0	186	4	71	739
0.0	.18436E 03	1	1	0	0	186	4	71	740
						186	4	0	741
.74186E 05	.18436E 03	0	0	0	0	186	4	72	742
0.0	.18436E 03	1	1	0	0	186	4	72	743
						186	4	0	744
.74186E 05	.18436E 03	0	0	0	0	186	4	73	745
0.0	.18436E 03	1	1	0	0	186	4	73	746
						186	4	0	747
.74186E 05	.18436E 03	0	0	0	0	186	4	74	748
0.0	.18436E 03	1	1	0	0	186	4	74	749
						186	4	0	750

APPENDIX: EXPERIMENTAL EVALUATED DATA SETS (Contd.)

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				0	0 186 4 75 751
,74186E 05	,18436E 03	0	0	0	0 186 4 75 752
0.0	,18436E 03	1	1		186 4 0 753
				0	0 186 4 76 754
,74186E 05	,18436E 03	0	0	0	0 186 4 76 755
0.0	,18436E 03	1	1		186 4 0 756
				0	0 186 4 77 757
,74186E 05	,18436E 03	0	0	0	0 186 4 77 758
0.0	,18436E 03	1	1		186 4 0 759
				0	0 186 4 91 760
,74186E 05	,18436E 03	0	0	0	0 186 4 91 761
0.0	,18436E 03	1	1		186 4 0 762
					186 0 0 763
					-1 0 0 764

*EØF

CCC END ØF FILE **