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INDC INTERNATIONAL NUCLEAR DATA COMMITTEE

Table of Content Translations

of

Soviet Reports received by the

INDC Secretariat

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Foreword

The INDC Secretariat receives a number of Soviet reports in Russian as part of the INDC document distribution system. Because of their large number and size most of them cannot be translated by the IAEA. The "Nuclear Physics Research in the USSR - Collected Abstracts" report series and occasional reports of interest to the nuclear data community are translated by the IAEA on a regular basis, and are normally given a "U" distribution.

The "Table of Content Translations" contain the translation of the table of contents, and abstracts when available, of those Soviet reports which the IAEA does not translate. The originals of these reports are noramlly available in limited quantities only and are given an INDC "G" distribution.

This issue contains the table of content translation of the following reports:

- Nuclear Constants, Number 1(36)
  Original distributed as INDC(CCP)-155/G

- Nuclear Constants, Number 3(38)
  Original distributed as INDC(CCP)-156/G

- Nuclear Constants, Number 4(39)
  Original distributed as INDC(CCP)-157/G

NUCLEAR CONSTANTS, Number 1(36)

INDC(CCP)-155/G

MEASUREMENT OF THE 239Pu AND 235U FISSION CROSS-SECTIONS AND THEIR RATIO FOR NEUTRONS WITH ENERGIES RANGING FROM 100 eV to 50 keV

A.A. Bergman, A.G. Kolossovskij, S.P. Kuznetsov, A.N. Medvedev, A.E. Samsonov, V.A. Tolstikov

The relative energy dependence of the ^{239}Pu and ^{235}U fission cross-sections have been measured with respect to the $^{10}B(n,\alpha)$ reaction spectrometer using the Pb moderation-time method. The fission events from fission chambers were registered simultaneously to have maximum accuracy for the ^{239}Pu to ^{235}U fission cross-sections ratio. The energy dependence of the cross-sections and the ratio of the cross-sections were normalized using the thermalized neutron spectrum obtained in a graphite prism.

CHANNEL ANALYSIS OF PHOTOFISSION FOR 236U and 238U

Yu.B. Ostanenko

Channel analysis of experimental data of the cross-section and the fragment angular distributions of photofission for ^{236}U and ^{238}U in a broad range of excitation energies, ranging from 3,5 MeV to 7,0 MeV, was carried out. In the framework of the uniform approach based on a doorway state model a reasonable description of a general behaviour and a resonance structure of both prompt fission anisotropic components cross-sections and the isomeric shelf photofission cross-section is obtained. The double-humped barrier parameters obtained in this analysis and results of other authors are compared.

240Pu NEUTRON RADIATION CAPTURE MEASURED IN THE BR-5 REACTOR CORE

V.I. Ivanov, V.A. Tolstikov

The radiation capture cross-section of ^{240}Pu for a neutron spectrum in the vicinity of the centre of the BR-5 reactor core with a fuel charge of PuO_2 and the relative distribution of capture integrals in ^{240}Pu along the height of a reactor have been measured by alpha and mass - spectrographic methods. The results of the measurements are compared with values obtained by averaging the available group constants for radiation capture of ^{240}Pu over the calculated reactor spectra.

DETERMINATION OF OPTICAL SCATTERING LENGTHS AND S_0-STRENGTH FUNCTIONS FOR THE 151,153Eu, 165Ho, 166-168,170Er, 197Au, 238U ISOTOPES

V.P. Vertebnij, N.L. Gnidak, A.V. Grebnev, A.L. Kirilyuk, G.M. Novosselov, E.A. Pavlenko, N.A. Trofimova

The resonance neutron self-shielding by the $^{151,153}Eu$, ^{165}Ho, $^{166-168,170}Er$, ^{197}Au, ^{238}U isotopes in transmission and scattering experiments has been investigated with the help of a Sc filter. Optical scattering lengths and S_0-strength function values are given.

COMPARISON BETWEEN EXPERIMENTAL DATA RELATIVE TO RADIATION NEUTRON CAPTURE BY SOME TRANSACTINIUM ISOTOPES IRRADIATED IN REACTOR BR-5 AND CALCULATIONS BASED ON NEW GROUP CONSTANTS SETS

V.I. Ivanov, I.P. Markelov, V.A. Tolstikov

A comparison between calculations using new group constants and experimental data relative to neutron-capture cross-sections for some transactinium isotopes on the neutron spectra near the centre of the BR-5 reactor with different fuelling (from plutonium dioxide and uranium carbide) has been carried out. The calculations of neutron spectra were carried out

using the ARAMACO program in the diffusion p-approximation and the one-dimensional geometry (a sphere). The new group constant sets BNAB-78 and OSKAR-76 are compared with the ARAMACO-70 set. An analogous comparison of the calculated and experimental data for neutron radiation capture was also carried out for the reactor EBR-II.

COMPARATIVE ANALYSIS OF THE NEUTRON CROSS-SECTION OF IRON FROM DIFFERENT EVALUATED NUCLEAR DATA LIBRARIES

V.M. Bychkov, V.V. Vozyakov, V.N. Manokhin, F. Small, P. Ressner, D. Seeliger, D. Hermsdorf

The comparative analysis of neutron cross-sections of iron from evaluated nuclear data libraries SOKRATOR, KEDAK, ENDL was performed in the energy interval from 0,025 eV to 20 MeV. Some of the iron cross - sections from SOKRATOR library were revised and new data, which were obtained by using new experimental data or more comprehensive theoretical methods, are recommended. As a result the new version of the iron neutron cross-section file (BNF 2012) is produced for the SOKRATOR library.

INCLUSION OF THE ENERGY DEPENDENT COLLISION DENSITY CAUSED BY RESONANCE SCATTERING IN GROUP CROSS-SECTION CALCULATION

V.V. Tebin, M.S. Yudkevich

The work shows the role played by the fluctuating collision density caused by resonance scattering in a mixture of isotopes with different atomic weight. the estimate of the effect in the resolved resonance region for ^{235}U, ^{238}U, ^{239}Pu, ^{240}Pu was made. The method is proposed to describe non-uniform behaviour of collision density for the calculation of self-shielded resonance cross-sections in sub-group approach for thermal reactor.

NUCLEAR CONSTANTS, Number 3(38)

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PERTURBATION THEORY AND SENSITIVITY ANALYSIS: AN EFFECTIVE METHOD FOR FISSION PRODUCT KINETIC STUDYING

Yu.G. Bobkov, A.S. Krivtsov, L.N. Usachev

Perturbation theory for fission product kinetics, code for base and adjoint equations solution, and sensitivity calculation are described in outline. Sensitivity analysis for pseudo-fragment capture cross-section, residual heat generation and other functionals were performed. Request list for fission product capture cross-section is presented.

ASYMPTOTIC BEHAVIOUR OF THE NEUTRON TRANSMISSION FUNCTION IN UNRESOLVED RESONANCE REGION

A.V. Komarov, A.A. Lukianov

Various integral forms of the energy-averaged transmission functions in unresolved resonance region are considered. The detailed analysis of their asymptotic properties with respect to target thickness and some practical formulae for the treatment of corresponding experimental data are presented.

THE PROGRAM OF RESONANCE CROSS-SECTION MULTILEVEL ANALYSIS

V.V. Kolessov

The computer program for the multilevel resonance cross-section analysis is developed. As example, the results of multilevel fitting for the ^{239}Pu fission cross-section in the range of 22.2 to 24.6 eV are presented. Fitting cross-sections are in good agreement with experimental data.

METHODICAL PROBLEMS OF THE PHENOMENOLOGICAL THEORY OF COLLECTIVE MOTION IN HEATED NUCLEI

I.R. Svin'in

This paper considers how to take into account the energy conservation law when describing the collective motion in heated nuclei with the nuclear friction approach. The problem of small vibrations in a viscous medium is investigated as an example. It is shown that in this case the motion is characterized by the motion integral that plays the same role as the mechanical energy in closed systems. At the same time stationary states are replaced by pseudostationary ones. The influence of the random force is discussed.

REVIEW OF THE PRINCIPAL DELAYED NEUTRON DATA

V.M. Sluchevskaya, I.P. Matveenko

On the basis of the analysis of published data on the following parameters of delayed neutrons (the decay constants, the relative and absolute intensities of the six groups, the total yields per fission, the average energies, and the energy distributions) for thermal fission of ^{233}U, ^{235}U, ^{239}Pu, ^{241}Pu, and fast fission of ^{232}Th, ^{233}U, ^{235}U, ^{238}U, ^{239}Pu, ^{240}Pu, ^{242}Pu is presented. Estimate of a delayed neutron parameter change as a function of the values of the reactivity and the effective fraction of delayed neutron is given.

MEASUREMENT OF THE AVERAGE NUMBER OF PROMPT NEUTRONS FROM NEUTRON-INDUCED FISSION OF 237Np

V.G. Vorob'eva, B.D. Kuzminov, V.V. Malinovskij, N.N. Semenova, V.I. Volodin

The experimental method $\bar{\nu}_p$, the average number of prompt neutrons emitted per fission, is described. The corrections and their influence on

the accuracy of the measured results are analyzed. The measured values of $\bar{\upsilon}_p$ are given for ^{237}Np fission induced by monoenergetic neutrons in the energy range from 1 MeV to 4 MeV as well as for the energy values 5,6 and 5,9 MeV.

THE LEVEL DENSITY AND DECAY OF STRONG DEFORMED HEAVY NUCLEI

V.M. Kuprianov, G.N. Smirenkin

An analysis of the experimental data of the mean level spacing in the first and the second wells of the potential deformation energy states are performed in the framework of a superfluidity nuclear model with an account of the collective and shell effects.

BACKGROUND CORRECTIONS FOR ACTIVATION MEASUREMENTS WITH ELECTROSTATIC ACCELERATORS

A.N. Davletshin, A.D. Tipunkov, S.V. Tichonov, V.A. Tolstikov

The question of background activities in measuring fast neutron radiation capture cross-sections has been considered. For the radiation capture cross-section measurement of ^{238}U and ^{197}Au it is shown, that corrections significantly change the value of the experimental cross-sections. It has been found out, that in measuring the radiation capture cross-sections relative to ^{197}Au no corrections of mutual compensation took place.

NUCLEAR CONSTANTS, Number 4(39)

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RADIATIVE CAPTURE CROSS-SECTIONS FOR FISSILE NUCLEI AT NEUTRON ENERGIES UP TO 3 MeV

V.A. Zenevitsh, A.B. Klepatskij, V.A. Konshin, E.Sh. Sukhovitskij

Radiative capture cross-sections for ^{238}U, ^{239}Pu and ^{240}Pu are calculated using the following level density models: the fermi-gas model, the fermi-gas model involving collective modes and the superfluid nucleus model. The non-spherical potential with carefully adjusted parameters is used to calculate neutron transmission coefficients. It is concluded that the best agreement between the experimental and theoretical data can be obtained for the level density fermi-gas model involving collective modes.

ELASTIC AND INELASTIC SCATTERING OF NEUTRONS IN THE ENERGY RANGE FROM 5 TO 8 MeV BY NATURAL MOLYBDENUM

S.P. Simakov, G.N. Lovtchikova, O.A. Salnikov, A.M. Trufanov, V. Pilz, Kh. Fertsh, T. Shtrail

Differential cross-sections of elastic and inelastic scattering of neutrons by molybdenum have been measured for incident neutron energies 4,91; 5,98; 6,98 and 8,01 MeV. The measurements were performed by time-of-flight method using the gas tritium target as the neutron source. The basic details of experimental arrangement and data reduction procedure are presented. Cross-sections were compared to available data from other works and are tabulated.

MEASUREMENT OF THE EXCITATION FUNCTIONS OF THE 238U LEVEL SERIES IN THE (n,n'γ)-REACTION

V.G. Kazyula, E.M. Kozulin, L.A. Pobedonostsev, Yu.A. Nemilov, L.V. Sysoeva, G.A. Tutin, A.A. Filatenko

The excitation functions of a series of the ^{238}U levels in the energy range of incident neutrons from 0,7 to 1,4 MeV have been obtained in this paper on the γ-radiation accompanying the process of inelastic neutron scattering. The values of neutron inelastic scattering cross-sections for the energy levels of 680 and 732 keV coincide with results of other authors. Data for the 930, 950, 1059 and 1060 keV levels are presented here for the first time.

TOTAL GAMMA-RAY PRODUCTION CROSS-SECTIONS FOR THE INTERACTIONS OF FAST NEUTRONS WITH COPPER AND MOLYBDENUM NUCLEI

M.V. Savin, I.N. Paramonova, V.A. Tshirkin, V.N. Ludin, N.N. Zalyalov

The measurement of the total gamma-ray production cross-section, with $E\gamma$ = 1-5 MeV, for the (n,x,γ)-reactions in natural copper and molybdenum in the neutron energy range of E_n = 1-10 MeV is described

CROSS-SECTIONS FOR CHARGED PARTICLE INELASTIC INTERACTION WITH NUCLEI

V.M. Bychkov, V.V. Karpov, A.B. Pashchenko, V.I. Plyaskin

The analysis of various optical model parameter systematics has been done with the purpose to provide the best description of available experimental information on charged particle interaction with nuclei. Optimum sets of optical potential parameters has been choosen for wide intervals of nuclei and energies of incident protons and α-particles. Absorption cross-sections and nuclear penetrability coefficients have been calculated for nuclei with $Z \geqslant 20$. A simple analytical formula is given for nucleons and α-particles absorption cross-section calculations.

CALCULATION OF REACTION CROSS-SECTIONS FROM MEASUREMENT RESULTS OBTAINED IN A PHOTOEMULSION CHAMBER

A.I. Vdovin, I.G. Golikov, I.I. Loshchakov

The description and analysis of the ^{12}C, ^{14}N, ^{16}O reaction cross-section measurements, for a proton energy of 50 MeV is given.

ANGULAR DISTRIBUTIONS OF 1,2H RECOIL NUCLEI IN ELASTIC COLLISIONS WITH IONS OF 4He AND 1H

V.A. Matusevitch, V.N. Sulema, Yu.P. Tsherdautsev, V.N. Shadrin

The angular distributions of recoil protons in the process of interacting with ^{4}He ions and recoil deuterons with ^{4}He ions are given.

ELECTRON-POSITRON FACTORS OF NUCLEUS EXCITATION CROSS-SECTIONS DURING ANNIHILATION OF POSITRONS IN THE K-SHELL OF HEAVY ATOMS

D.P. Gretshukin, A.A. Soldatov

The electron-positron factors of nucleus excitation cross-sections during annihilation of po itrons on atomic shell as well as the factors determining an excited nucleus orientation have been calculated in this paper.