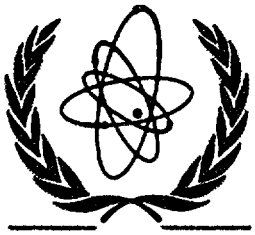

International Atomic Energy Agency

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INDC INTERNATIONAL NUCLEAR DATA COMMITTEE

Summary Report of the Third Research Co-ordination Meeting on DEVELOPMENT OF REFERENCE INPUT PARAMETER LIBRARY FOR NUCLEAR MODEL CALCULATIONS OF NUCLEAR DATA (Phase I: Starter File)

International Centre for Theoretical Physics, Trieste, Italy
26 to 29 May 1997

Prepared by

Pavel OBLOŽINSKÝ
IAEA Nuclear Data Section
Vienna, Austria

September 1997

Reproduced by the IAEA in Austria
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Abstract

The report contains the summary of the 3rd and the last Research Co-ordination Meeting on "Development of Reference Input Parameter Library for Nuclear Model Calculations of Nuclear Data (Phase I: Starter File)", held at the ICTP, Trieste, Italy, from 26 to 29 May 1997. Details are given on the status of the Handbook and the Starter File - two major results of the project.

September 1997

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1 Summary of the Meeting

Objectives and Participation

The 3rd Research Co-ordination Meeting (RCM) on "Development of Reference Input Parameter Library (RIPL) for Nuclear Model Claculations of Nuclear Data (Phase I: Starter File)" was held at the ICTP Trieste, Italy, from 26 to 29 May 1997. The local host of the meeting was G. Reffo, Nuclear Data Center, ENEA Bologna, Italy.

The purpose of the meeting was to review the work performed under the CRP since the 2nd RCM, particularly to review the draft of the RIPL Handbook and to make final recommendations for the RIPL Starter File. A.V. Ignatyuk of the IPPE Obninsk, Russia served as a chairman of the meeting. The detailed Agenda is attached (see Appendix 1).

The meeting was attended by chief scientific investigators of all 8 laboratories participating in the project, by 1 consultant and by 3 cost-free observers. The participating laboratories were represented by M.B. Chadwick (Los Alamos, U.S.A.), A.V. Ignatyuk (Obninsk, Russia), T. Fukahori (Tokai-mura, Japan), S. Kailas (Bombay, India), G. Molnár (Budapest, Hungary), G. Reffo (Bologna, Italy), Su Zongdi (Beijing, China) and P.G. Young (Los Alamos, U.S.A.). Furthermore, J. Kopecky (Alkmaar, The Netherlands) attended as a consultant, and E. Běták (Bratislava, Slovakia), R. Capote Noy (Habana, Cuba) and V.M. Maslov (Minsk, Belarus) attended as observers. For the full list including affiliations see Appendix 4.

Main Conclusions and Recommendations

Actions from the previous meeting were reviewed and it was concluded that they were essentially fulfilled. Especially appreciated was the work done by M.B. Chadwick by assembling a full draft of the RIPL Handbook, and the work done by G. Molnár by producing histogram plots of cumulative numbers of discrete levels.

The following recommendations were made:

1. The RIPL Starter File will be prepared for the release by the end of 1997.
2. The RIPL Handbook will be published as an IAEA TECDOC during 1998. To this end, E. Běták (Bratislava) will be given a contract for editing of the Handbook so that the final draft is available before the end of 1997.
3. Phase II of the RIPL project will be initiated as a new CRP in 1998.
4. A meeting/workshop on nuclear level densities will be held in 1998.

2 Progress Reports

Progress Reports were delivered by all laboratories participating in the CRP. These reports reflect the activity of participants over the last one and a half year since the 2nd RCM held in Vienna, 30 October - 3 November 1995. More details can be found in the extended abstracts of the Progress Reports given in Appendix 2.

As a common result, a complete draft of the RIPL Handbook was prepared before the present meeting, using contributions from all CRP participants. The draft, comprising 200 pages, represents a valuable summary of the work done in the course of the RIPL project.

It was noted that useful contributions to the RIPL project were provided by 2 individual Research Contracts. Ms. M. Avrigeanu (Bucharest, Romania) contributed to partial level densities and V.M. Maslov (Minsk, Belarus) contributed to fission level densities.

3 Handbook and Starter File

3.1 Outline of the Handbook

The full title of the Handbook will be "Reference Input Parameter Library" with the subtitle "Handbook for Calculations of Nuclear Reaction Data". The Handbook should be published as an IAEA Technical Document (TECDOC).

It was agreed that each chapter of the Handbook will start with a Summary (maximum half a page), and it will include obligatory sections Format, Conclusions and Recommendations, References and, if necessary, Annex, the rest will be left on the decision of the chapter coordinator:

* Summary
  - What is addressed in chapter
  - Brief recommendations
  - State recommended file names explicitely
* Format
* Conclusions and Recommendations
* References
* Annex

The assumed length of the RIPL Handbook is 200 pages. It was agreed that the outline of the Handbook will be as follows:

Executive summary (Obložinský)
1. Masses, Shell Corrections and Deformations (Chadwick)

2. Discrete Level Schemes (Molnár)
3. Average Neutron Resonance Parameters (Reffo)
4. Optical Model Parameters (Young)
5. Level Densities
   5.1. Total Level Densities (Ignatyuk)
   5.2. Fission Level Densities (Maslov)
   5.3. Partial Level Densities (Chadwick)
6. Gamma Ray Strength Functions (Kopecky)
7. Continuum Angular Distributions (Chadwick)

Supplement (Capote Noy)
Appendix 1: RIPL files (Obložinský)
Appendix 2: Selected papers from RIPL meetings (Obložinský)

3.2 Starter File

The RIPL Starter File will consist of Readme, 7 Segments, and Supplement. Each segment will include 2 types of files:

- Recommended files and
- Other files.

The files included into the Starter File will be in accordance with the recommendations incorporated in the revised draft of the RIPL Handbook. Each file will be accompanied by a readme file.

It was agreed that it is necessary to devise a consistent set of new file names. These new names will replace the old (current) file names. See Appendix 3 for details.

3.3 Specific Recommendations

The draft of the RIPL Handbook and the contents of the RIPL Starter File were discussed in detail. The following recommendations for the Handbook and, where relevant, for the Starter File were made:

Executive Summary. This part of the Handbook (about 4 pages) will cover 2 points:
- Motivation of the project, national efforts, credit to participants
- Introduction to RIPL

1. Masses
   * Modifications: Definitions will be added, format will be described, reference to Audi'95 will be made, 2 figures (shell corrections and quadrupole deformations) will be added.
   * Recommended files: MOLLER_TABLE2 (to be checked by Chadwick why it is shorter than the older file)
   * Other files: BEIJING_MCC_1_1, JAERI (1 file to be merged by Fukahori), AUDI_95 (to be taken from IAEA).

2. Discrete level schemes
   * Modifications: Annex 1 and 2 will be removed, figures Nos. 1-2 will be modified, figures showing Uo values will be added.
   * Recommended files: BUDAPEST_96_LEV (current format type 1 only), BUDAPEST_96_CUMULATIVE.
   * Other files: BEIJING_DLS_0, BOLOGNA_BNLF, JAERI (1 file to be merged by Fukahori), LIVERMORE_LEVELS, OBNINSK_SEDL and OBNINSK_SEDL_RADA.

3. Average neutron resonance parameters
   * Modifications: Added will be table (about 5 pages to be provided by Ignatyuk) of recommended average neutron resonance parameters, added will be 4 figures.
   * Recommended files: OBNINSK_AVRPAR (new file to be provided by Ignatyuk).
   * Other files: BEIJING_LRD2 (corrected version of present LRD_2 file as provided on a diskette by Su Zongdi at the present meeting), MINSK (new file to be provided by Ignatyuk).

4. Optical model parameters
   * Modifications: Annex 3 will be deleted and replaced by 1 example, additional optical model potentials will be provided by Kailas, a table will be added summarizing OM potentials and few figures will be added.
   * Recommended files: LOSALAMOS_PGY (modified files will be submitted by Young).
   * Other files: LOSALAMOS_PGY.FOR, and preliminary also BEIJING_OMP2, JAERI (1 file to be merged by Fukahori). If the information from the last 2 files will be included into the recommended file, then these 2 files will be deleted.

5. Level densities

   5.1. Total level densities
      * Modifications: 7 figures will be provided by Ignatyuk, recent major papers on level densities will be mentioned and commented, Moller-Nix single-particle level file will be mentioned. Equations and references will be carefully reviewed.
      * Recommended files: BEIJING_NLD_1_1_BS (for backshifted), BEIJING_NLD_1_1_GC (for Gilbert and Cameron) and OBNINSK_GSM2 (for generalized superfluid model, new file to be provided by Ignatyuk), OBNINSK_LEVDEN.FOR and .EXE to be provided by Ignatyuk.
      * Other files: BEIJING_NLD_1_1_GSM, BEIJING_NLD_1_1.FOR, JAERI (1 file to be merged by Fukahori), OBNINSK_GC1 and OBNINSK_BS1 (new files to be provided by Ignatyuk).

   5.2. Fission level densities
      * Modifications: Set of equations will be included, several figures will be included.
      * Recommended files: MASLOV_BARRIERS.
      * Other files: BEIJING_FBP, OBNINSK_BARRIERS (modified version will be provided by Maslov).

5.3. Partial level densities
   * Modifications: Included will be microscopic procedure to be submitted by Capote, included will be actual parameters, also included will be the general description of the current state of the part, discussed will be consistency between partial and total level densities.
   * Recommended files: AVRIGEANU_PLD.FOR (already submitted to the IAEA), subroutine CAPOTE_MICRO.FOR for microscopic calculations to be provided by Capote.
   * Other files: None

6. Gamma-ray strength functions
   * Modifications: Included will be the reference and short explanation of the Beijing files, references will be put at the end of the chapter, extended will be section 6.1 by the results of the recent work of Herman et al, considered will be the recent systematics for E2 giant resonances (to be supplied by Kailas), deleted will be section 6.3.1.
   * Recommended files: BEIJING_GDP_1_1 and KOPECKY.
   * Other files: None

7. Continuum angular distributions
   * Modifications: Included will be several figures.
   * Recommended files: LIVERMORE_ANGELMC (updated version to be submitted by Chadwick, prefix of the file name will be changed to LOSALAMOS), LIVERMORE_ANGEL (name to be modified to KALBACH).
   * Other files: None

Supplement. This is a new part of the Handbook and also a new part of the Starter File. Briefly described will be the single-particle level file of Moller and related code to calculate total level densities. Included into the Starter File will be MOLLER_LEVELS in the compressed form (15 MBytes) and the code OBNINSK_MICRO.FOR and .EXE to be provided by Ignatyuk.

Appendices. No national library will be described, the contents will be as folllows:
- RIPL Files will be listed in accordance with the contents of the Starter File (to be prepared by Obložinský).
- Three selected papers will be added: Young (Cervia 1994), Young (Vienna 1995) and Uhl (Cervia 1994).

3.4 Procedures and Deadlines

1. Starter File
   - The IAEA will create a general backup file of the current collection of RIPL files (immediately after the present meeting)
   - Modified files will be submitted by the participants to the IAEA (15 September 1997). If possible, files should be submitted by ftp to the NDS open area:

    * ftp iaeand.iaea.or.at
    * ndsopen
    * cd [.ripl.starterfile]
    * put your.file
    * quit
  - Starter File will be created immediately afterwards
  - The participants will check the Starter File, particularly their own files and provide comments to the IAEA (15 October 1997).
  - The procedure to access the files is as follows:
    * ftp iaeand.iaea.or.at
    * ripl
    * cd [.optical]
    * get file.name
    * quit

    The files can be accessed also through the Web, using http://www-nds.iaea.or.at/ripl/.

2. Handbook
  - The IAEA will distribute LaTeX files to the coordinators (15 June 1997)
  - The coordinators will modify the text, prepare postscript files for figures (1 figure = 1 postscript file) and send them before 15 September 1997 to Běták (betak@savba.sk) and also ftp them to the NDS open area:
    * ftp iaeand.iaea.or.at
    * ndsopen
    * cd [.ripl.handbook]
    * put your.file
    * quit
  - The revised draft (draft No. 2) will be prepared by Běták (30 October 1997)
  - The revised draft will be distributed by the IAEA to all participants of the present meeting immediately afterwards
  - The participants will send their comments to Běták (betak@savba.sk) and also to the IAEA (30 November 1997)
  - The final version will be prepared by Běták (31 December 1997) and submitted to the IAEA Publishing Committee for approval as an IAEA TECDOC.

3.5 Dissemination

The dissemination of RIPL to users will start in 1998:
- The Starter File will be announced in the IAEA Nuclear Data Newsletter and in the IAEA Web page (spring 1998).
- The Handbook is expected to be published as an IAEA TECDOC during 1998.

4 Phase II of the RIPL Project

Phase II of the RIPL project was discussed in detail. It was understood that the initiation of Phase II will be meaningful only after succesful completion of the current Phase I of the project. It was further understood that the Phase II would represent a new CRP, with new goals and new CRP participants.

The following problems should be addressed in the Phase II, listed with the priorities:

1. Development of input modules (interfaces) for several well established nuclear reaction codes for nuclear data evaluations (GNASH, STAPRE, ALICE, ECIS, SCAT2, SINCROS, CINDY).
2. Development of retrieval capabilities.
3. Testing and validation of the Starter File.
4. Improvement and extension of the Starter File.

Participants of the Phase II should include users of the library. The following laboratories were identified as potential participants: CNDC Beijing, ENEA Bologna, BARC Bombay, IP SAS Bratislava, HAS Budapest, CEADEN Havana, LANL Los Alamos, BAS Minsk, IPPE Obninsk, ECN Petten, JAERI Tokai-mura and KAERI (South Korea).

Initiation of the Phase II was recommended for 1998.

5 Proposal for a Meeting on Nuclear Level Densities

The recent International Conference on Nuclear Data for Science and Technology (Trieste, 19-24 May 1997) has put in evidence new works and continuing interest in the study of nuclear level density treatment.

As it is well known, nuclear level density is the quantity involved in reaction formalisms carrying the largest uncertainty. In addition, the range of nuclear data requests has been greatly enlarged according to increasing demand from fundamental physics research both theoretical and experimental (nuclear astrophysics, accelerator design etc.) and from applied nuclear physics (accelerator driven systems, radioactive ion beams, medical applications etc.). Such demands require approaches offering reliable extrapolations off the valley of stability and covering higher excitation energy range.

The last specialists' meeting on nuclear level density was held by the OECD NEA in 1989. We feel the necessity to have soon another specialists' meeting, may be in the form of a workshop, where the different approaches are reviewed and discussed with the aim of arriving at a clear picture of the state of the knowledge and at some recommendation, including delineating research perspectives. In particular, this meeting would be useful for providing indications to the Phase II of the RIPL project.

Accordingly, the present participants wish to suggest the IAEA to support a nuclear level density meeting or workshop in 1998.

INTERNATIONAL ATOMIC ENERGY AGENCY
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Appendix 1

IN REPLY PLEASE REFER TO:
PRIERE DE RAPPELER LA REFERENCE:

DIAL DIRECTLY TO EXTENSION:
COMPOSER DIRECTEMENT LE NUMERO DE POSTE: 21712

3rd Research Co-ordination Meeting on
"Development of Reference Input Parameter Library for Nuclear Model Calculations of Nuclear Data (Phase I: Starter File)"
International Centre for Theoretical Physics (I.C.T.P.)
Trieste, Italy
26 to 29 May 1997

AGENDA

Monday, 26 May 1997

09:00-09:30 Opening

- Opening Remarks (Host - G. Reffo; IAEA - P. Obložinský)
- Adoption of Agenda
- Announcements

09:30-12:30 Reports

- Review of Actions from the 2nd Meeting (All Participants)
- Status of RIPL files (Obložinský)
- Progress Reports (15' each)
  1. Chadwick: Partial Level Densities, Angular Distributions, Masses and Deformations for RIPL
  2. Fukahori: Progress on Reference Input Parameter Library for Nuclear Model Calculations of Nuclear Data at JAERI Nuclear Data Center
  3. Ignatyuk: Average Parameters of Neutron Resonances and Level Density Parameters
  4. Kailas: Progress Report of the Bombay Group
  5. Kopecky: Progress Report on the Gamma-Ray Strength Functions
  6. Molnár: Progress Report by Budapest Group: Discrete Level Schemes Sublibrary
  7. Reffo: Average Parameters of Neutron Resonances
  8. Su Zongdi: Progress on Reference Input Parameter Library for Nuclear Model Calculations of Nuclear Data
  9. Young: Activities at Los Alamos for the Optical Model Segment of the RIPL CRP

Notes: *Progress Reports should be kept short and informative. Each reporter should give a brief overview, in 15', of the work done after the 2nd Meeting. Each reporter should bring with him a 2-page summary of his Progress Report for inclusion into the Meeting Report.*

12:30-14:00 Lunch break

14:00-18:00 Handbook on the RIPL Starter File: Review of the Draft
I. Masses, Shell Corrections and Deformations (coordinator Chadwick)
II. Discrete Level Schemes (coordinator Molnár)

Notes: *Reviewed will be the draft of the Handbook, including recommendations on the final contents of the Starter File. Each segment will be introduced by the segment coordinator who will serve also as a discussion leader.*

Tuesday, 27 May 1997

09:00-12:30 Handbook: Review of the Draft continued
III. Average Neutron Resonances (coordinator Reffo)

12:30-14:00 Lunch break

14:00-18:00 Handbook: Review of the Draft continued
IV. Optical Model Parameters (coordinator Young)

Wednesday, 28 May 1997

09:00-12:30 Handbook: Review of the Draft continued
V. Level Densities (coordinator Ignatyuk)
- Total Level Densities (Ignatyuk)
- Fission Level Densities (Ignatyuk and Maslov)
- Partial Level Densities (Chadwick)

12:30-14:00 Lunch break

14:00-18:00 Handbook: Review of the Draft continued
VI. Gamma-Ray Strength Functions (coordinator Kopecky)
VII. Continuum Angular Distributions (coordinator Chadwick)

Drafting of the Meeting Report

Thursday, 29 May 1997

09:00-12:30 Drafting of the Meeting Report continued

Proposal for the Phase II of the RIPL Project

12:30-14:00 Lunch break

14:00-17:00 Concluding Session
- Adoption of the Meeting Report
- Conclusions
- Adjournment

Appendix 2

EXTENDED ABSTRACTS OF PROGRESS REPORTS

Partial Level Densities, Angular Distributions, Masses and Deformations for RIPL

Mark Chadwick, LANL

Since the last RIPL meeting in Vienna, the following progress has been made:

Masses and Deformation Parameters

- Worked with Peter Moller to extend his mass table to Z < 8 *and also* N < 8, using experimental values from Audi. Used the same Audi citation for masses as was used for higher Z,A, values, to be consistent.
- Received some experimental masses for Su Zongdi. However, in discussions with Moller, we felt that it would be most consistent if we do not include these values. This is because numerous other mass measurements have also been made recently, and these would all have to be included – a big undertaking. Also, the Moller file as we are presenting it is accurately referenceable
- Summarized this work in RIPL Handbook Chapter

Partial level densities

- Interacted with M. Avrigeanu in her development of a code with subroutines to calculate different partial level density models
- Ran the code, and read her documentation

- Summarized this work, and provided recommendations in the RIPL Handbook chapter

Continuum angular distributions

- Code ANGELMC.FOR, the Chadwick-modified version of Kalbach's code ANGEL.F, which also calculates photonuclear angular distributions, is available for RIPL
- 2 publications describing the above photonuclear angular distribution theory are now in print
- Applied the physics-based angular distribution theory of Chadwick and Oblozinsky (recommended in RIPL handbook) to Blann's new Hybrid Monte Carlo Simulation (HMS) precompound model. Very successful results were obtained, up to 250 MeV. The work has been submitted to Physical Review C for publication
- Wrote a chapter in the RIPL Handbook describing angular distribution physics, with recommendations

LaTeX RIPL Handbook

- Put together RIPL Handbook contributions from CRP members, and converted into LaTeX format

Progress on Reference Input Parameter Library for Nuclear Model Calculations of Nuclear Data at JAERI Nuclear Data Center

Tokio Fukahori
Nuclear Data Center, Japan Atomic Energy Research Institute
Tokai-mura, Naka-gun, Ibaraki-ken, 319-11 Japan
e-mail: fukahori@cracker.tokai.jaeri.go.jp

The Integrated Nuclear Data Evaluation System (INDES) is being developed for the purpose of ;

- to keep the experiences from JENDL-3 evaluation work, especially model parameters which were used in the task and not kept in the evaluated file, and
- to support a new evaluation calculation by using some nuclear physics codes.

The model parameter database related to IAEA/CRP on Reference Input Parameter Library (RIPL) are also stored in INDES. The development of JAERI main frame computer version of INDES will be completed soon and that of UNIX or WWW version is now being prepared.

The progress at JAERI Nuclear Data Center after the 2nd meeting is;

- The level density parameters from JENDL-3 evaluation of the elements from Hf to Fm have been prepared and sent to Dr. Ignatyuk. These parameters were compared with other databases by him.
- As a trial task, it is tried to produce a sample WWW home page of RIPL for mass data. The image of these WWW pages are shown in **Figs. 1** and **2**.

For the next step, it is very useful to create WWW pages like above to inform the RIPL for many people.

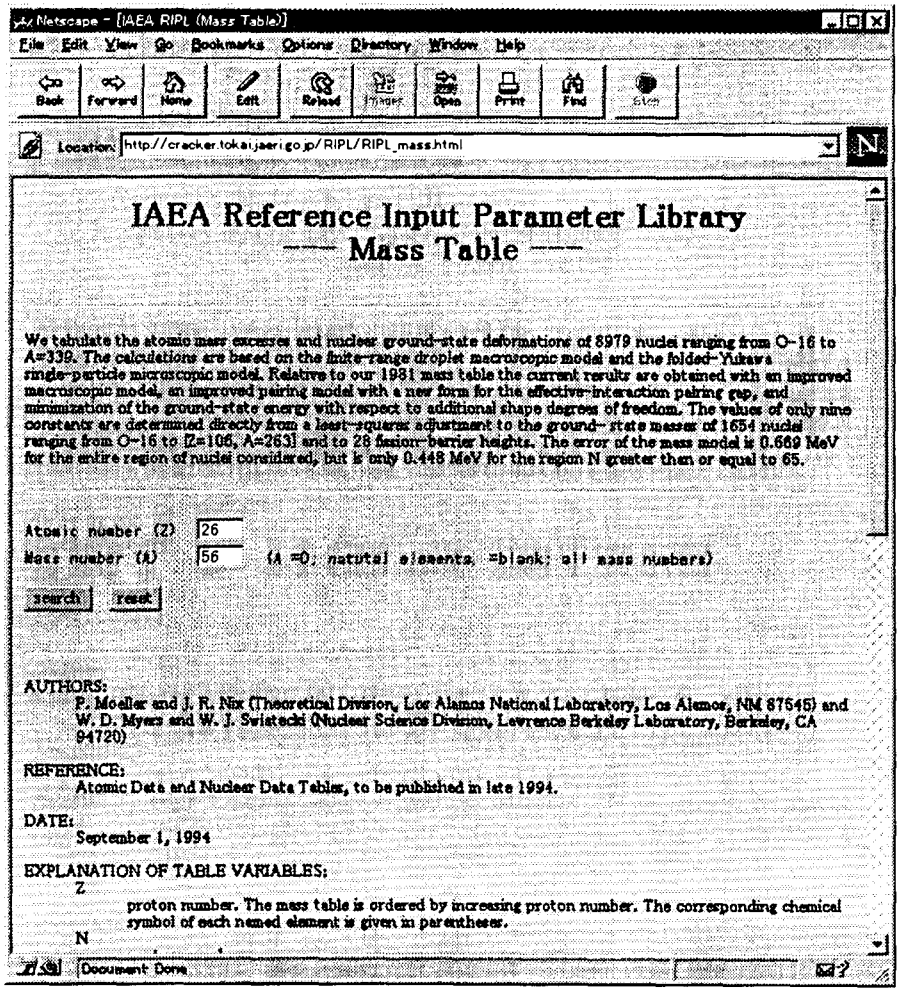

Fig. 1 Selection Menu Page of Mass Table Data of RIPL

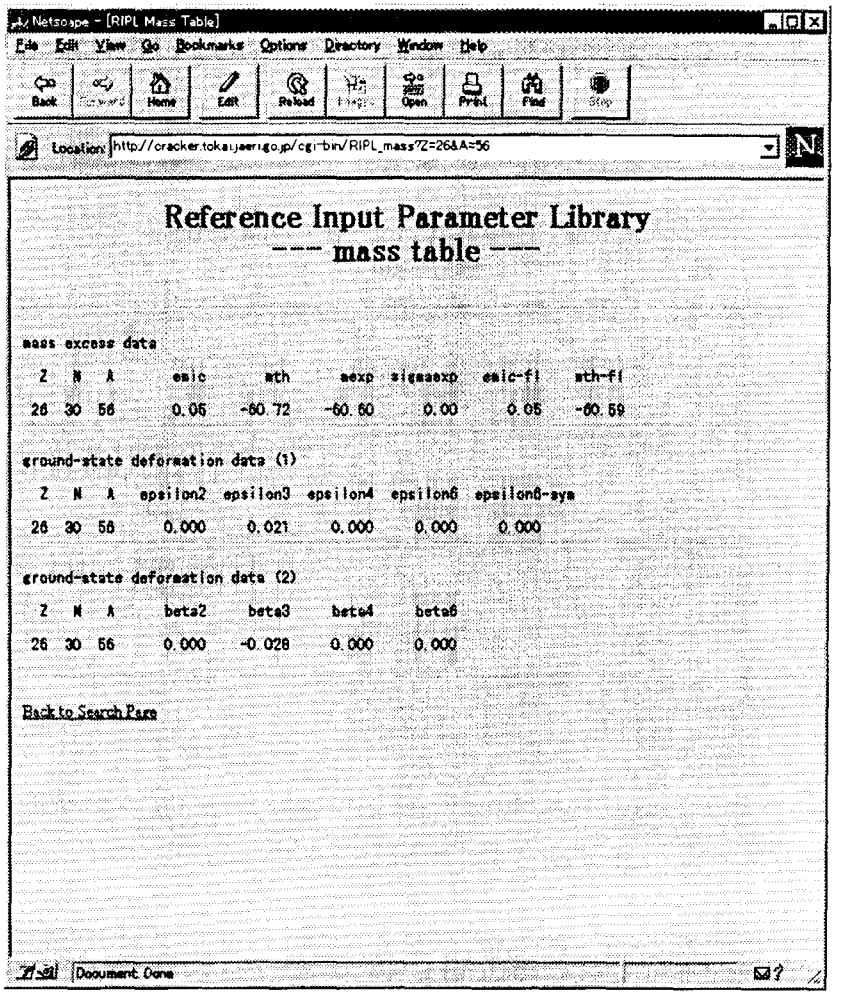

Fig. 2 Selected Results According to the Fig.1 Input

AVERAGE PARAMETERS OF NEUTRON RESONANCES AND LEVEL DENSITY PARAMETERS

A.Ignatyuk, IPPE, Russia

Since the last CRP Meeting in Vienna the following progress has been made:

Re-evaluation of average resonance parameters

Bologna and Obninsk groups met three times in Bologna and Madrid to discuss the statistical methods used for the analysis of average resonance parameters. The joint analysis was performed for about 50 nuclei included in the list contradicting evaluations. The reasons of contradictions were traced and consistent evaluations of the resonance spacings, neutron strength functions and their uncertainties were obtained for most discrepant examples.

Obninsk group repeated the analysis of resonance parameters for about 80% of nuclei included into the RIPL files. For most cases the new results confirm the previous evaluations and give more reliable estimations of uncertainties of the average parameters.

In the meantime Beijing group has performed the new re-evaluation of average resonance parameters in which most contradictions of their previous estimations were removed. New evaluations agree rather well with the Obninsk's results excluding nuclei for which do not exist resolved resonance parameters and the average parameters were estimated by Beijing group on the basis of parameter systematics for neighbouring nuclei.

Minsk group was involved in the analysis of resonance parameters for heavy nuclei. Their results were discussed during two meeting at Obninsk and Trieste. The final results of Minsk group confirm majority evaluations of Obninsk group.

So the Obninsk's and joint Bologna-Obninsk's re-evaluated values of the average resonance spacings, neutron strength functions and radiative widths should be considered as most accurate evaluations and they must be taken as the recommended table of average resonance parameters. Into the final version of the recommended parameters some recent evaluations of other groups based on new experimental data were added. New versions of recommended parameters were prepared as the contributions to RIPL and the corresponding chapter of the RIPL Handbook.

Level density parameters and systematics

The revised resonance spacings were used to estimate new versions of the level density parameters for the three models: Gilbert-Cameron model, back-shifted Fermi gas model and generalized superfluid models. The obtained parameters were compered with similar set of parameters evaluated by Beijing, Bombay and JAERI groups. The plots that display available deviations of parameters were prepare as a contribution to the RIPL-Handbook.

On the basis of comparisons performed the recommended parameters for each model were estimated. For the Gilbert-Cameron and back shifted Fermi gas models the

Beijing group parameters were chosen as recommended ones. For the generalised superfluid model parameters of Obninsk group were recommended. The chapter to the RIPL Handbook describing main equations of the models and all files of parameters included into the starter file was prepared.

Relations of the level density parameters for equilibrium deformation of nuclei with the corresponding parameters of fissioning nuclei were discussed with Minsk group and consistent recommendations for the fission level densities were proposed.They are reflected into contribution to the RIPL Handbook prepared by V.Maslov.

Progress Report of the Bombay Group

S. Kailas, BARC, Bombay, India

As per recommendations of the Second CRP Meeting held in Vienna from 30 October to 3 November 1995, the following tasks on the optical model parameters have been completed by BARC, Bombay Group:

1. Literature survey of the optical model potential parameters available for neutrons, protons, deuterons, tritons, helions and alphas has been continued. A large number of new sets of parameters have been collected and the same will be included in the master list being prepared by Dr. P.G. Young.

   The format for listing the optical model potential parameters is modified to include the coupled vibrational and non-axial deformed potential parameters, thus making it most general to accommodate different types of potentials employed in nuclear model calculations of nuclear cross sections.

   This work is being done in association with Dr. P.G. Young who is the coordinator of this segment of the CRP.

2. In order to provide a basis for parameter recommendations, the theoretical cross sections calculated starting from the neutron - nucleus optical model potential sets available in the literature have been compared with the corresponding experimental data. About half a dozen most commonly used optical potentials have been chosen for this exercise. The total, the elastic and the reaction cross sections have been calculated using the various sets of optical potentials. Neutrons in the energy range of 1 to 150 MeV have been considered. The targets like C, Al, Ca, Fe, Sn, Pb and U have been included in this computation exercise.

   Some nuclei specific potentials have also been considered for comparison. The computer code SCAT2 has been employed for these computations. The cross sections have been compared with the experimental data available in the literature.

This work has been done in collaboration with Drs. P.G. Young and M.B. Chadwick, LANL, U.S.A. An abstract based on this work has been submitted to the International Conference on Nuclear Data for Science and Technology, Trieste, May 1997.

In addition, the volume integrals, both for the real and imaginary parts of the various potentials have been computed. The volume integrals calculated for the best fit potential for a given nucleus are compared with the ones computed for the global potentials. This exercise will enable identification of the global potential more close to the nucleus specific potential and will serve as a basis for parameter recommendations.

Progress report on the Gamma-Ray Strength Functions

(J. Kopecky - coordinator)

Since the last Meeting in Vienna (October 1995) the following progress has been achieved:

A. Actions from previous meeting

According to the actions of the Vienna Meeting 4 files have been assembled for the electronic version of RIPL. They are:

1. KOPECKY_README.TXT file (description of other KOPECKY_ subfiles)

2. KOPECKY_GRP.TXT (includes recommended Lorentzian giant resonance parameters and their global descriptions)

3. KOPECKY_SYS.DAT (includes recommended formulae for trend systematics of gamma-ray strength functions and the ratio f(E1)/f(M1) derived from the present experimental data base, which is also included).

4. KOPECKY_SF.TXT (includes recommended models and formulae for calculation of gamma-ray strength functions for E1, M1 and E2 multipolarities).

Further the corresponding descriptive text has been prepared for the first draft of the RIPL Handbook.

B. Review of recent developments

Further a systematic review of the recent new developments in this field has been performed, both in the experimental and theoretical areas. This review has been orally presented during the Trieste Meeting.

In the experimental part the results of the two-step-cascade (TSC) method has been discussed (the Prague and Dubna groups, see e.g. Refs. [1,2]). Further the new experimental method [(He-3,$\alpha\gamma$) experiments] to study the effect of collective excitations around 3 MeV on the distribution of gamma-ray strength has been presented (the Oslo group in Ref. [3]).

A new systematics for E1 giant resonance parameters has been developed in the collaboration of the University of Messina and ENEA Bologna [4]. These results shall be incorporated in KOPECKY_GRP subfile of RIPL.

In the theory of strength function the recent work of A. Plujko (Kiev) has been reviewed. He derived a new formula for f(E1) based on the theory of collisional damping of nuclear

collective vibrations. The results are very similar to those of Kadmenskij and Kopecky/Uhl, thus supporting the recommended approach in RIPL.

References:

[1] F. Becvar et al., Phys. Rev. C52 (1995) 1278.
[2] A.M. Sukhovoj et al., Contribution to the NDST97 Conference in Trieste, (19-24 May, 1997).
[3] T.S. Tveter et al., Phys.Rev.Let. 77(1996) 2404.
[4] A. D'Arrigo et al., to be submitted to Journal of Physics.
[5] A. Plujko, Radiative Strength Functions as a Tool in Studying of Mechanisms of the Nuclear Dissipation, Contribution to the NDST97 Conference in Trieste, (19-24 May, 1997).

Progress Report by Budapest Group

DISCRETE LEVEL SCHEMES SUBLIBRARY

Authors: J. Östör, T. Belgya and G. L. Molnár
Presented by G. L. Molnár

1. A new discrete level schemes data library

An entirely new discrete levels file has been created by the Budapest group according to the recommended principles, using the Evaluated Nuclear Structure Data File, ENSDF [1] as a source. The data set "Adopted levels and gammas" (as of 23 February 1996) has been retrieved and processed as outlined below.

- The 106,234 discrete nuclear levels and 148,129 gamma-ray transitions adopted by the ENSDF evaluators for 2,807 nuclei have been retrieved on line, using the program NUDAT. [2]

- The retrieved ENSDF data have been filtered for errors and converted into a library file in the extended Bologna format, as described in ref. [3].
- The cutoff energy, U_{max}, and the cumulative number, N_{max}, of levels up to this energy have been determined as described in the next chapter and has been included in the file as a cutoff value up to which the discrete level scheme is complete.
- A second energy cutoff, U_c, corresponding to the upper energy limit of levels characterized by an unique spin and parity has been determined for all nuclei on the basis of ENSDF data alone.

The resulting library [3] contains 96,834 levels and 105,423 gamma rays for 2,585 nuclei, with their characteristics such as energy, spin, parity, half-life as well as gamma-ray energy and branching percentage. Isomer flags for half-lives longer than 1 s have been introduced. For those 1,277 nuclei having at least ten known levels the cutoff level numbers N_{max} are also included. The cumulative level numbers N_c for the cutoff energies U_c, corresponding to the upper energy limit of levels characterised by an unique spin and parity, have been included for each nuclide in the library. The file is available in ASCII format, following the extended ENEA Bologna convention, from the IAEA Nuclear Data Section.

2. Level density histograms and nuclear temperatures

The same data set has been used for plotting the cumulative number of levels of nuclei in the form of histograms.(staircase plots). In the generation of level density plots at least ten known levels have been required, including the ground state. This constraint has left us with 1,277 cases out of the set of 2,585 nuclei described above. The histograms were then fitted with the back-shifted exponential formula:

$$N(E) = \exp\left(\frac{E - U_0}{T}\right)$$

where T is the nuclear temperature, and U_0 is the backshift energy. The excitation energy has been used as a weighting factor, in order to minimize the influence of $N(E)$ values at the high-energy end where our knowledge becomes incomplete. Based on these fits T, U_0 and the U_{max} cutoff parameters have been determined for 1,277 nuclei. It is noteworthy that in 111 cases this cutoff value is larger than the lowest of the two single-nucleon separation energies [4]. In other words, these fits include unbound states as well. A detailed description, including the set of plots, may be found in a separate publication [5].

This work has been supported by IAEA research contracts Nos. 8068/RB and 8992/R0.

References

1. Evaluated Nuclear Structure Data File (ENSDF), produced by members of the International Nuclear Structure and Decay Data Network, and maintained by the National Nuclear Data Center, BNL, USA. Also available online from IAEA Nuclear Data Section, Vienna.
2. NUDAT database, version (23 February 1996), maintained by the National Nuclear Data Center, BNL, USA. Also available online from IAEA Nuclear Data Section, Vienna.
3. Chapter 2, in: Draft of Handbook on Reference Input Parameter Library for Nuclear Model Calculations of Nuclear Data.
4. G. Audi and A.H. Wapstra, "The 1995 update to the atomic mass evaluation," Nucl. Phys. A595 (1995) 409.
5. T. Belgya, G. L. Molnár, B. Fazekas and J. Östör, Histogram plots and cutoff energies for nuclear discrete levels, INDC(NDS)-367 (IAEA Vienna, 1997)

Average Parameters of Neutron Resonances

G. Reffo CDN-ENEA

Since the last RIPL meeting in Vienna the following progress has been made.

Detecting discrepancies

The analysis was performed of different average resonance parameter tables provided in previous RIPL meetings, namely Bologna, Obninsk, Beijing, in addition to the well known Brookhaven compilation.

Discrepancies were found in some 50% of cases and reasons for such discrepancies were discussed and traced.

Methods for statistical analysis

Bologna and Obninsk met three times and went deep into the discussion of statistical methods of analysis for neutron resonance parameter schemes.

This brought to a common way of performing statistical analysis of resonance parameter schemes.

Re-analysis of parameter schemes

A joint analysis was performed by Bologna and Obninsk for some 50 most discrepant nuclei. Subsequently Obninsk repeated the analysis of about 80% nuclei.

In the meantime also Beijing has been issuing separately a new re-evaluation of average resonance parameters. This new compilation showed quite a good overall agreement with the work of Obninsk. It included in particular some 20 more isotopes not included in Obninsk and Bologna evaluations.

In addition the Minsk group produced a set of average neutron resonance parameters for the actinide region. This work was found to be very accurate and reliable.

Tables of recommended average resonance parameters

The joint re-evaluation Bologna-Obninsk and Obninsk re-evaluation were taken as the final recommended table of average resonance parameters.

This was complemented with the additional isotopes from Beijing tables missing in the other evaluations and with the actinide evaluation by Minsk.

Conclusions

In the end of this RIPL CRP we have made available to the Nuclear Data Section the first set of tables of average resonance parameters internationally elaborated and agreed.

These were obtained by use of most sophisticated methods of analysis applied also to most recently measured resonance parameter sets. these tables include s- and p-wave strength functions mean resonance spacings and total radiative widths.

The tables give indications of the resonance sample adopted and of the estimated confidence interval.

Progress on Reference Input Parameter Library for Nuclear Model Calculations of Nuclear Data (III) *

Su Zongdi[1,2,3] Huang Zhongfu[2] Liu Jianfeng Sun Zhengjun[1] Zuo Yixin[5]
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Zhang Xiaocheng[5] Wang Baijin[1] Ma Gonggui[3]

* The project supported in part by the International Atomic Energy Agency and the National Natural Science Foundation of China.

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The research objective is to develop the corresponding model parameters further,to update and expand the data files of the nuclear parameter library, and to improve and perfect its management-retrieval codes for widespread application according to the Agency Research Contract, the tasks and actions determined at the 2nd RCM on "Reference Input Parameter Library", and the project on development of the updated Chinese Evaluated Nuclear Parameter Library CENPL-2(the Second Version) commenced in 1996. The main progress in the past period is as follows.

1. Average Neutron Resonance Parameters and Cumulative Number of Levels

A new set of the average neutron resonance spacings D_0 and neutron strength functions S0 for 309 nuclei were reestimated on the basis of the resolved resonance parameters reevaluated from BNL-325, ENDF/B-6, JEF-2, and JENDL-3, and the cumulative number No of low lying levels for 344 nuclei were also reevaluated by means of the histogram. A new data file LRD-2 (the Second Version) with the updated D_0, S_0 and N_0 values and their uncertainties d D_0, dS_0 was completed in 1996. The uncertainties of D_0 values were further corrected recently.

In the estimation of average neutron resonance parameters, the information on both the neutron widths and the level positions was used simultaneously. Therefore the estimated D_0 values can further be improved in the accuracy and reliability. In addition, the χ^2 -squared statistical tests of the D_0 values with the experimental samples(sample number of tests > 90) from BNL-325, ENDF/B-6, JEF-2 and JENDL-3 were made. The distribution of the level spacings used Wigner distribution and up cut-tailed Gauss distribution.

2. Level Density Parameters

Three sets of level density parameters for the Gilbert-Cameron(GC) formula, back-shifted Fermi gas model(BS) and generalized superfluid model(GSM) have been reestimated by fitting the D_0 and N_0 values of CENPL.LRD-2. The other three sets of level density parameters of 249 nuclei for the three formulas by fitting the D_0 and N_0 values from Obninsk[1] have also been reestimated in order to compare, select and recommend the level density parameters.

The two sets of level density parameters for each level density formulas have been obtained by fitting different D_0 and N_0 values, which are from CENPL.LRD-2 and Obninsk[1]. The results are being analysed and compared. There is a difference between the two sets due to the disparity in D_0 and N_0 values. The recommended level density parameters should be reasonable in physics and with good systematics behavior. Therefore, the reasonableness estimated the level density parameters can further test the recommended D_0 and N_0 values. The estimated level density parameters should satisfy a

requirement in accuracy, and the results met the accuracy requirement often are not only. So the level density parameters with systematics should be selected and recommended.

3. Semiempirical Peak Energy Formulas of Giant Dipole Resonance

The semiempirical peak energy formulas for the double peak giant dipole resonances of the photonuclear reaction in the large deformation nucleus regions have been derived in view of the peak energy formula of single peak giant dipole resonance in spherical regions[2] and by leading the deformation parameter reasonably, i.e.

$$E_{g1} = 45Z^{(-1/3)}A^{0.05}/(1+\tfrac{2}{3}\delta),$$

$$E_{g2} = 45Z^{(-1/3)}A^{0.05}/(1-\tfrac{1}{3}\delta).$$

The peak energies in the mass region 50<A<250 were calculated, and calculated results are in good agreement with the experiments available.

4. The Other Sub-Libraries

An improved and updated second version of sub-library of atomic masses and characteristic constants for nuclear ground states(MCC-2) has been set up. It contains two data files: MCC2_1 and MCC2_2. In MCC2_1, the most recent measured, systematics and calculated mass excesses [3,4], total binding energy[3], deformations[4] for 9066 nuclei ranging from Z=0, A=1 to Z=136, A=339 were compiled. The MCC2_2 contains the abundance, magnetic and quadrupole moments[5] of nuclear ground state for neutron and 286 stable nuclei ranging from Z=1, A=1 to Z=92, A=238 up to now.

The data file of the sub-library of discrete level schemes and branching ratios of gamma decay (DLS) were corrected and supplemented by using the recent experiments of the discrete levels and their gamma-rays for ^{120}Cs, ^{129}La, ^{130}La, ^{135}Gd, ^{153}Ho, ^{157}Tm and ^{209}Rn[6]

Acknowledgement

The authors would like to thank NDS/IAEA for providing us the data on mass excesses, ENSDF and so on.

References:

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[3] G. Audi and A. H. Wapstra, Nucl. Phys., A595, 409(1995).
[4] P.Moller et al., Atomic Data Nucl. Data Tables, 59(1995)85.
[5] R.B. Firestone, Table of Isotopes(8th Edition), in 1996.
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ACTIVITIES AT LOS ALAMOS FOR THE OPTICAL MODEL SEGMENT OF THE RIPL CRP

P. G. Young, 10 May 1997

SUMMARY VERSION

1. FORMAT OF THE OPTICAL MODEL PARAMETER LIBRARY

Since the 1995 meeting of the RIPL CRP in Vienna, a number of changes and extensions have been made to the format for optical model parameters. The changes were necessary to accommodate additional forms of optical model potential representations that were encountered in the literature, and to better represent rotational and vibrational models. In addition to expanding our general form of the potential to handle a few additional cases, three special formats were developed for handling non-standard potentials by A. B. Smith (ANL), Engelbrecht and Fiedeldey (South Africa), Varner et al. (ORNL), Bersillon (BRC - SCAT2 code), Delaroche (BRC), and Koning (ECN). Several of these potentials are the results of careful analyses and should be preserved. The potential used by Delaroche and Koning promises to be particularly important in the future, according to the extent that the ECISVIEW program is pursued.

2. CONTENTS OF THE LIBRARY

A computer code was developed that permitted the various potentials compiled at Bombay to be included in the library. Subroutines were developed for reading and writing the library, and a simple code was written to produce a summary of the potentials in the library. Additionally, a number of new potentials were added to the library.

To date, some 107 optical model parameterizations are included in the library, comprised of 75 parameterizations for incident neutrons, 21 parameterizations for incident protons, 2 for incident deuterons, 1 each for incident tritons and ^{3}He particles, and 7 parameterizations for incident alpha particles. These potentials have been selected mainly from analyses made at Los Alamos for various applied calculations , from a set of parameters supplied by JAERI and others specifically for the RIPL library, and from several well known global optical model parameterizations. Each potential included is given a unique reference number, according to a numbering system designed to separate the potentials for different incident particles into different reference number regions, and to provide approximate information on the sources of the various potentials by geographical region.

3. VALIDATION OF THE OPTICAL MODEL LIBRARY

Validation of the potentials in the library should be carried out at two levels: (1) ensuring that the potentials in the library are both complete and accurate, and (2) testing how well the potentials agree with the available experimental data base. Some effort has been directed at checking the accuracy of entries into the file by careful proofreading, resulting in the removal of

a number of errors. Additional efforts are needed in this area and, in particular, a processing code should be developed that will retrieve information from the file and print it out in standard, easily readable form.

A visit by Dr. A. Kumar of Bombay was hosted at Los Alamos in order to begin efforts to compare a few of the potentials with experimental data. In this study neutron total, reaction, and elastic scattering cross sections are compared with experimental data for 6 global potentials and 5 regional or nuclide-specific potentials.

4. CONCLUSIONS AND RECOMMENDATIONS

Because of the limited number of potentials included in the library thus far and, especially, because of the very limited testing done, it is difficult to make general recommendations for global optical model potentials at present. However, some general comments can be made. In every case where local potentials were compared by Kumar et al. to global potentials, the local parameterizations produced better agreement with the experimental data than did the global potentials. So one firm conclusion is that additional, carefully chosen nuclide-specific potentials should be included in the RIPL library. Also it was observed that, if a global optical potential must be used for incident neutrons, then the Wilmore and Hodgson potential often gave reasonable results below 30 MeV in the limited tests performed, and the Madland Semmering potential usually gave reasonable results for both neutrons and protons from ~30 to 200 MeV. Again, it should be emphasized that the parameterizations included and the comparisons with experiment that were made were very limited in scope and should be expanded.

The largest differences in the reaction cross sections calculated with the various potentials by Kumar et al. occurred at fairly low energies, which were not tested in the comparisons. To test the low energy reaction and elastic cross section predictions requires performing Hauser-Feshbach calculations. Such tests should clearly be carried out.

In conclusion, it can be said that we have succeeded in developing an initial or starter file of optical model parameterizations in a format that is easily expanded, together with initial codes and subroutines for handling the data. While the existing library already promises to be useful, it is essential that follow on activities occur to enhance its usefulness. A summary of improvements or areas where additional work is needed includes:

1. Additional potentials must be incorporated into the library. For example, potentials from programs in China, Russia, Bologna, and the JEFF and ENDF communities must be added.
2. Additional processing codes should be developed for checking, displaying, linking of the library to optical model codes, and comparing predictions from the parameter file with experimental data.
3. Extensive checking and validation of the library, especially when more processing codes become available.

Appendix 3

RIPL File Names

This document establishes a consistent set of file names to be used in the RIPL Starter File. Old (current) names are given in capitals, new names are given for the purposes of the present document in lower case so that better graphical distinguishing of old and new names is achieved.

A. Directory Tree

New structure of directories of the RIPL Starter File is shown below in a form of a tree. The main directory is ripl, there are altogether 9 basic directories, including readme, 7 segments and supplement. Each segment (for densities each of 3 subsegments) has 2 subdirectories, for recommended files and for other files.

Main Directory	Basic Directory	Subdirectory	Subdirectory
	readme		
	.....	.....	.....
	masses		recommended
			other_files
	.....	.....	.....
	levels		recommended
			other_files
	.....	.....	.....
	resonances		recommended
			other_files
	.....	.....	.....
	optical		recommended
			other_files
	.....	.....	.....
ripl		total	recommended
			other_files
		.....	.....
	densities	fission	recommended
			other_files
		.....	.....
		partial	recommended
			other_files
	.....	.....	.....
	gamma		recommended
			other_files
	.....	.....	.....
	angular		recommended
			other_files
	.....	.....	.....
	supplement		
----------	----------	----------	----------

The above tree shows the sequence of directories in a way the RIPL Handbook will be arranged, rather than in the current alphabetical sequence generated automatically by the DEC Alpha computer. This can be achieved by providing a simple Web interface to RIPL for a comfortable transfer of files to users. The first version of this service is already available, for the participants of the RIPL project, at http://www-nds.iaea.or.at/ripl/.

B. Directory Names

The RIPL Starter File is located at the disk No 4, therefore the full name of the main directory is ud4:[ripl].

Old main directory	New main directory	Remark
UD4:[RIPL]	ud4:[ripl]	No change

The basic directories remain unchanged except for a small modification in the segment Gamma Ray Strength Functions.

Old basic directory	New basic directory	Remark
UD4:[RIPL.README]	ud4:[ripl.readme]	-
UD4:[RIPL.MASSES]	ud4:[ripl.masses]	-
UD4:[RIPL.LEVELS]	ud4:[ripl.levels]	-
UD4:[RIPL.RESONANCES]	ud4:[ripl.resonances]	-
UD4:[RIPL.OPTICAL]	ud4:[ripl.optical]	-
UD4:[RIPL.DENSITIES]	ud4:[ripl.densities]	-
UD4:[RIPL.GAMMAS]	ud4:[ripl.gamma]	Change
UD4:[RIPL.ANGULAR]	ud4:[ripl.angular]	-
-	ud4:[ripl.supplement]	New

Each segment is further split into 2 subdirectories, for recommended files and for other files. For example,

Old subdirectory	New subdirectory	Remark
-	ud4:[ripl.masses.recommended]	For recommended files
	ud4:[ripl.masses.other_files]	For other files

C. Structure of File Names

As a rule, new file names will be created by coupling together 3 words, yielding full names with the structure

originator_explanation.type

As *originator* one should use the name of a laboratory providing a file if the file came from a CRP participant. In (a few) cases where files came from individuals outside the CRP, names of these individuals are used. RIPL is used for files generated by the whole RIPL team.

Old originator	New originator	Remark
BEIJING	beijing	-
BOLOGNA	bologna	-
BOMBAY	bombay	-
BUDAPEST	budapest	-
JAERI	jaeri	-
LIVERMORE	livermore	-
LOSALAMOS	losalamos	-
OBNINSK	obninsk	-
RIPL	ripl	-
-	kalbach	New
KOPECKY	kopecky	-
MASLOV	maslov	-
MOLLER	moller	-

Explanation indicates the contents of the file. Since the name of the basic directory serves this purpose, explanation is generally omitted. However, it is always given when more than 1 file in 1 subdirectory has the same originator.

Type reflects the type of data in the file, such as README for ASCII text, DAT for numerical data, FOR for a source code and EXE for executable version of a source code. Several changes were introduced:

Old type	New type	Remark
DAT	dat	-
FOR	for	-
EXE	exe	-
TXT	readme	Change
TAB	dat	Change
-	tex	LaTeX file
-	ps	Postscript

D. File Names

Listed below are files with their full names as contained in each basic directory. Each file name has its readme file, however only 1 readme file is provided for a group of files of the same originator in 1 subdirectory.

In several instances a subdirectory has its readme file as a short explanation of the contents of the subdirectory, applied to the cases where this is not self-explanatory.

Readme

Old file name	New file name	Remark
-	ripl_handbook.tex	Handbook, LaTeX file
-	ripl_handbook.ps	Handbook, postscript file
RIPL_README.TXT	ripl.readme	Brief description of RIPL

1. Atomic Masses, Shell Corrections and Deformations

Old file name	New file name	Remark
MOLLER_TABLE2.DAT	moller.dat	Recommended file
MOLLER_README2.TXT	moller.readme	Recommended file
-	readme	Other file, for all
-	audi_95.dat	Other file, new
-	audi_95.readme	Other file, new
BEIJING_MCC_1_1.DAT	beijing.dat	Other file
BEIJING_MCC_1_1_README.TXT	beijing.readme	Other file
JAERI_03_DEFORM.DAT	jaeri_deform.dat	Other file, merged
JAERI_03_README.TXT	jaeri.readme	Other file
JAERI_DEFORM.DAT	-	Merged
JAERI_NUCL01.DAT	-	Merged
JAERI_NUCL02.DAT	-	Merged

2. Discrete Level Schemes

Old file name	New file name	Remark
BUDAPEST_B96_LEV_FORMAT1.DAT	budapest_levels.dat	Recommended file
BUDAPEST_96-CUMULATIVE	budapest_cumulative.dat	Recommended file
	budapest.readme	Recommended file
-	readme	Other file,for all
BEIJING_DLS_0.DAT	beijing.dat	Other file
BEIJING_DLS_0_README	beijing.readme	Other file
BOLOGNA_BNLF.DAT	bologna.dat	Other file
-	bologna.readme	Other file
JAERI_03_LVL.DAT	jaeri.dat	Other file, merged
JAERI_03_README.TXT	jaeri.readme	Other file
JAERI_LVL01.DAT	-	Merged
JAERI_LVL02.DAT	-	Merged
LIVERMORE_LEVELS.DAT	livermore.dat	Other file
-	livermore.readme	Other file
OBNINSK_SEDL.DAT	obninsk_levels.dat	Other file
OBNINSK_SEDL_RADA.DAT	obninsk_branchings.dat	Other file
-	obninsk.readme	Other file

3. Average Neutron Resonance Parameters

Old file name	New file name	Remark
OBNINSK_AVRPAR.DAT	obninsk.dat	Recommended file
-	obninsk.readme	Recommended file
BEIJING_NLD_LRD_2.DAT	beijing.dat	Other file, see DENSITIES
-	beijing.readme	Other file
-	minsk.dat	Other file, new
-	minsk.readme	Other file

4. Optical Model Parameters

Old file name	New file name	Remark
LOSALAMOS_PGY_DESC6.DAT	losalamos_format.dat	Recommended file
LOSALAMOS_PGY_NLIB3.DAT	losalamos_potentials.dat	Recommended file
LOSALAMOS_PGY_README.TXT	losalamos.readme	Recommended file
LOSALAMOS_PGY_REFSYS.DAT	losalamos_references.dat	Recommended file
LOSALAMOS_PGY_SUMMARY.DAT	-	Merged
-	readme	Other file,for all
BEIJING_OMP2.DAT	beijing.dat	Other file
BEIJING_OMP2_README.TXT	beijing.readme	Other file
JAERI_03_OMP.DAT	jaeri.dat	Other file, merged
JAERI_03_README.TXT	jaeri.readme	Other file
JAERI_OMP.DAT	-	Merged
LOSALAMOS_PGY_OMIN.FOR	losalamos_get.for	Other file
LOSALAMOS_PGY_OMOUT.FOR	losalamos_put.for	Other file
LOSALAMOS_PGY_OMSUMRY.FOR	losalamos_summary.for	Other file
-	losalamos.readme	Other file, new

5. Level Densities

5.1. Total Level Densities

Old file name	New file name	Remark
-	readme	Recommended file,for all
BEIJING_NLD_1_1_B-S.DAT	beijing_bs.dat	Recommended file
BEIJING_NLD_1_1_G-C.DAT	beijing_gc.dat	Recommended file
-	beijing.readme	Recommended file
OBNINSK_GSM.DAT	obninsk_bcs.dat	Recommended file
-	obninsk.readme	Recommended file
-	readme	Other file, for all

BEIJING_NLD_1_1.EXE	beijing.exe	Other file
BEIJING_NLD_1_1.FOR	beijing.for	Other file
BEIJING_NLD_1_1_GSM.DAT	beijing_bcs.dat	Other file
-	beijing.readme	Other file
BEIJING_NLD_2_LRD.DAT	-	To be moved to resonances
JAERI_03_LDP.DAT	jaeri.dat	Other file, merged
JAERI_LDP01.DAT	-	Merged
-	jaeri.readme	Other file
-	obninsk_bs.dat	Other file, new
-	obninsk_gc.dat	Other file, new
-	obninsk.for	Other file, new
-	obninsk.exe	Other file, new
-	obninsk.readme	Other file

5.2. Fission Level Densities

Old file name	New file name	Remark
MASLOV_BARRIERS.DAT	maslov.dat	Recommended file
-	maslov.readme	Recommended file
-	readme	Other file, for all
BEIJING_FBP.DAT	beijing.dat	Other file
-	beijing.readme	Other file
OBNINSK_BARRIERS.DAT	obninsk.dat	Other file, modified
-	obninsk.readme	Other file

5.3. Partial Level Densities

Old file name	New file name	Remark
-	readme	Recommended file, for all
-	losalamos.for	Recommended file
-	losalamos.readme	Recommended file
-	capote_micro.for	Recommended file
-	capote.readme	Recommended file

6. Gamma-Ray Strength Functions

Old file name	New file name	Remark
-	readme	Recommended file,for all
BEIJING_GDP_1_1.DAT	beijing_gdr.dat	Recommended file
BEIJING_GDP_1_1_README.TXT	beijing.readme	Recommended file
KOPECKY_JUKO_GRP.TXT	kopecky_gdr.dat	Recommended file
KOPECKY_JUKO_README.TXT	kopecky.readme	Recommended file
KOPECKY_JUKO_SF.TXT	kopecky_strength.dat	Recommended file
KOPECKY_JUKO_SYS.DAT	kopecky_systematics.dat	Recommended file

7. Continuum Angular Distributions

Old file name	New file name	Remark
LIVERMORE_ANGELMC.FOR	losalamos.for	Recommended file
-	losalamos.readme	Recommended file
LIVERMORE_ANGEL.DAT	kalbach.dat	Other file
LIVERMORE_ANGEL.FOR	kalbach.for	Other file
LIVERMORE_README.TXT	kalbach.readme	Other file

Supplement

Old file name	New file name	Remark
-	readme	For all
-	moller_levels.dat	New
-	moller_levels.for	New
-	moller_levels.exe	New
-	moller.readme	New
-	obninsk_micro.for	New
-	obninsk_micro.exe	New
-	obninsk.readme	New

334-F4-RC-569.3 Appendix 4

INTERNATIONAL ATOMIC ENERGY AGENCY

Final Research Co-ordination Meeting on
"Development of Reference Input Parameter Library for
Nuclear Model Calculations of Nuclear Data
(Phase I: Starter File)"

International Centre for Theoretical Physics (I.C.T.P.)
Trieste, Italy
26 to 29 May 1997

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