IEC-122

Status Report of NEANSC Working Party on International Evaluation Cooperation: Subgroup 13: Intermediate Energy Nuclear Data Evaluation

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2. Meetings

May 11, 1994 at Park Vista Hotel, Gatlinburg, USA
Dec. 9, 1994 at NEA Data Bank, Paris, France
(Upcoming) October 23–27 1995, Smolenice, Slovakia

3. Current Tasks

- Possible new data needs and a high–priority request list were produced and reviewed.
- An intercomparison of high–energy model codes has been held and discussed.
- A summary of the inquiry for intermediate energy nuclear data needs was reported.
- Format for intermediate energy nuclear data was proposed and discussed.
- Status reports of members were collected (attached as appendix).
- Summary of experiments and status of databases was reported.
- A pilot evaluation for Fe and Th is proposed.

4. Future Tasks

- A further specification of data needs (sensitivity aspects) and a revision of the high–priority request list.
- An Intermediate Energy Activation Yields intercomparison has been approved and will be held in 1995.
- It is proposed to organize a NEA Specialist Meeting on the Optical Model above 20 MeV.
- The pilot evaluations will be performed by different participants and intercompared.
- All presently existing high–energy evaluations should be stored at a central place, the NEA Data Bank.
- Compilation of experimental data will be continued.
- Evaluated activation files should be extended to higher energies.

5. List of documents

Doc.s13.01 A.J. Koning: "Review of High Energy Data and Model Codes for Accelerator–Based Transmutation", NEA Data Bank Report NEA/NSC/DOC (92) 12.

Doc.s13.02 A.J. Koning: "Requirements for an Evaluated Nuclear Data File for Accelerator–Based Transmutation", NEA Data Bank Report NEA/NSC/DOC(93) 6.

Doc.s13.03 Y. Kikuchi: Objectives of Subgroup 13, November 1993.

Doc.s13.04 Y. Kikuchi: Inquiry form for data needs, March 1994.

Doc.s13.05 A.J. Koning: Meeting report of the first meeting of SG13, Gatlinburg, USA, May 11, 1994.

Doc.s13.06 M. Blann, summary report of the Thin Target Group, Meeting on the "International Code Intercomparison for Intermediate Energy Nuclear Data", NEA Data Bank May 30– June 1 1994.

Doc.s13.07 D. Filges, summary report of the Thick Target Group, Meeting on the

"International Code Intercomparison for Intermediate Energy Nuclear Data", NEA Data Bank May 30– June 1 1994.

Doc.s13.08 Y. Kikuchi and T. Fukahori: Result of Inquiry on Intermediate Energy Nuclear Data Needs for Various Applications as Start-up Task of SG13, JAERI internal report, November 1994.

Doc.s13.09 T. Fukahori: Proposal of Format for Intermediate Energy Nuclear Data, JAERI internal report, November 1994.

Doc.s13.10 M.B. Chadwick and M. Blann: Status of LLNL intermediate-energy data activities

Doc.s13.11 A. Ferrari: Activities on intermediate-energy modelling/data going on in Milan/Cern

Doc.s13.12 S.G. Mashnik: Intermediate-energy modeling/data activities going on in Bogoliubov Laboratory of Theoretical Physics, JINR, Dubna

Doc.s13.13 A.J. Koning: Meeting report of the second meeting of SG13, NEA Data Bank, Paris, France, Dec. 9, 1994.

Doc.s13.14 Y. Shubin et al.: Status report on Intermediate Energy Nuclear Data at IPPE, Obninsk, December 1994.

Doc.s13.15 P.G. Young, D.G. Madland, R.E. MacFarlane: Summary of Intermediate Energy Nuclear Data Activities by the Nuclear Physics and Applications Group (T-2) at Los Alamos, December 1994.

Doc.s13.16 E. Ramstroem: Status of intermediate energy data activities in Sweden, December 1994.

Doc.s13.17 R. Michel: Activities report at Zentrum fuer Strahlenschutz und Radiooekologie, Universitaet Hannover, December 1994.

Doc.s13.18 A. Daniel: report on SITHA code, December 1994.

Doc.s13.19 T. Fukahori: Present status of JENDL High Energy Project, March 1995.

Doc.s13.20 A.J. Koning: High Priority Nuclear Data Request List For Intermediate Energies, April 1995.

The Quantum Molecular Dynamics (QMD)

In this theory, degree-of-freedom of every nucleon in the target + projectile system is taken into consideration as Gaussian distributions in the coordinate and momentum spaces. Time evolution of the parameters which represent the centroids of each nucleon in the coordinate and momentum spaces (6 parameters, 3 for coordinate and 3 for momentum space) is determined by the Newtonian equation and the stochastic nucleon-nucleon collision as similar to the cascade model. The mean-field potential appearing in the Newtonian equation is calculated in a self-consistent way from an effective nucleon-nucleon interaction. The mean-field potential gives rise to self-bound target and projectile, the quantum refraction/reflection and acceleration/deacceleration. The collision is responsible for energy diccipation. In QMD, the Fermi statistsics is contained only in the collision part as the Pauli blocking effects.

The QMD calculation is performed until a certain time, and the remaining fragments are identified as well as their excitation energy. If the fragmens are in excited states, statistical particle emission is also taken into consideration. In the figures below, (p,xn) cross sections of Fe at 113 and 800 MeV calculated by QMD+statistical decay model are compared with data measured at LANL and those calculated by cascade + evaporation code NUCLEUS.