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Subgroup 30 of the Working Group on Nuclear Data Evaluation Co-operation (SG30 WPEC) Summary Report of the First Meeting

QUALITY IMPROVEMENT OF EXFOR

10 and 11 October 2007
IAEA Headquarters, Vienna, Austria

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First meeting of the

Subgroup 30 (SG30) of the
NSC Working Party on International Nuclear Data Evaluation Cooperation (WPEC)

on

QUALITY IMPROVEMENT OF EXFOR

held at the
International Atomic Energy Agency (IAEA) Headquarters,
Vienna, Austria
10 and 11 October 2007

SUMMARY REPORT

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and

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Abstract

The present report contains presentations, recommendations and a list of actions from the first meeting of WPEC/SG30, a recently established subgroup of the NSC Working Party on International Nuclear Data Evaluation Cooperation on "Quality improvement of EXFOR". The main objective of this subgroup is to assess and improve the accessibility and quality of EXFOR, an international database of experimental nuclear reaction data. The meeting was held in conjunction with the annual meeting of the Network of Reaction Data Centres (NRDC), a worldwide cooperation under the auspices of the IAEA, established to coordinate compilation and dissemination of nuclear reaction data.

December 2007

1. General

The first meeting of the OECD/NEA WPEC Subgroup 30 on the Quality improvement of EXFOR was held at IAEA Headquarter in Vienna, Austria, on 10-11 October 2007. These discussions followed on from a meeting of the International Network of Nuclear Reaction Data Centers Network (NRDC) to ensure input and comments from the centres maintaining the EXFOR database.

2. Presentations and related discussions

A. Koning presented the general objectives of SG30 to the members of the NRDC, as formulated in the proposal to WPEC. A general discussion followed on the objectives and planned activities ofSG30.

A. Koning provided a list of "problems" he has recently encountered in analyzing the tabulated form of EXFOR provided by V. Zerkin. Not all of them turned out to be errors. Instead some of them are allowed within the EXFOR format. The tabulated ("C4" or "T4" formats) file extracted from EXFOR via a translation tool developed by V. Zerkin has been available to SG30 participants since mid2007. Work is in progress in order to improve the translation capabilities.

A. Mengoni suggested inclusion of an estimate of the level of completeness of EXFOR in the work plan of SG30 (SG30 work plan did not include this task). This proposal was approved.

A. Mengoni, together with S. Dunaeva and other IAEA/NDS staff will investigate how such an estimate can be made. The current estimates are 85% of all incident neutron measurements are contained in EXFOR and about 25% are compiled for incident photons.

P. Oblozinsky gave a short overview of related activities at NNDC that are planned in the coming years. One central issue is the Global Nuclear Data Initiative (GNDI), which integrates nuclear data evaluations and validations into one automated computational scheme. Clearly, a good quality EXFOR file plays an important role in such an initiative.

V. Zerkin presented another intermediate EXFOR format, which he calls XT4 ("extended T4") representing a more readable version of the original EXFOR file in which the data are properly aligned in columns. There is 100% conversion from the original EXFOR file to the XT4 file. Another important issue is the conversion of EXFOR to a table in numerical format the C4 file. Currently, the conversion ratio is about 50%.If the entire reaction dictionary is used for the X4toC4 code, a conversion ratio of 93% can be achieved. This conversion can be done, but the results have not been tested. V. Zerkin will continue to work on increasing the conversion ratio from the current 50% and testing the results.

H. Henriksson and N. Soppera presented the plans of the NEA Data Bank for SG30. A website has been set up: www.nea.fr/science/wpec/SG30. Although the NEA tabular format (which is different from C4) is unlikely to be further extended, the NEA will focus on reading EXFOR directly with the JANIS tool. The success of this translation route will be tested by NEA producing data in C4 tabular format running JANIS in batch mode. The results can then be compared with the X4toC4 route, which will be of benefit to all parties. The production of tabular formatted files will be initiated by the NEA in the coming months.

N. Otsuka presented work on EXFOR undertaken in Japan, primarily by JAEA and Hokkaido University. There is an EXFOR related website available: www.jcprg.org/exfor. His presentation addressed two important points for SG30: (1) storing uncertainties in a well defined manner as a simple example, he showed the problem in distinguishing between systematic and statistical uncertainties in EXFOR;(2) storage of residual products from high-energy reactions - there is the option of storing them as one product

per subentry or by using the ELEM/MASS keyword (no clear preference could be inferred from the discussions).

S. Dunaeva gave a short overview of some recent errors that have been corrected (including the list sent by A. Koning), and stated that error corrections can now be executed much faster than before.

J.C. David presented some problems encountered by CEA while attempting to retrieve complete high-energy data sets. There are at least two problems: (1) double-differential particle spectra, e.g. for (p,xn) reactions there appear to be different ways to retrieve these data, and for every isotope the identifier required for retrieval is different; (2) residual nuclide production, where the data are stored in too many subsections (same issue as raised by N. Otsuka).

3. Other discussions

The C4format needs to be extended, maybe even beyond the width of 80 characters, in order to distinguish between the statistical and systematic uncertainties.

Statistical tests performed by E. Dupont are very valuable and they have already given rise to some EXFOR improvements as outlined in one of the NRDC documents of V. Zerkin. However, the participants in the meeting would like to see a different presentation of the results, enabling a clearer view on possible problems.

A. Koning will make available his directory structured database based on C4. Web links will be placed at the NEA and/or IAEA website.

4. Tasks/Actions

V.Zerkin: continue the X4toC4 translation process and aim for 93% conversion.

H. Henriksson/N. Soppera: extend the capabilities of JANIS to read EXFOR and produce a C4 file from this material.

A.Koning: make available his directory structured database.

A. Mengoni, S. Dunaeva: investigate how to obtain an estimate of the completeness of EXFOR for all incident particles.

V. Zerkin, N. Otsuka and A. Trkov: work on an extension of the C4 format to include the product ZA for residual production cross sections (translation of the ELEM/MASS keyword)

Appendix A

First Meeting of WPEC SG30 on

"Quality improvement of EXFOR"

International Atomic Energy Agency (IAEA), Vienna, Austria
10 and 11 October 2007

Preliminary AGENDA

Wednesday, 10 October - Meeting Room A0742

14:30 17:30 Presentations

- Subgroup 30General introduction and goals, A.J.Koning
- Possibilities of IAEA translation tools, V. Zerkin
- JANIS and revised computational formats, H. Henriksson/N. Soppera
- Ideas from JAEA, N. Otsuka

Thursday, 11 October - Meeting Room A2313

9:00 12:00 Presentations (continued)

- Input from BNL, B. Pritychenko
- Experience and proposals from FZK, A. Konobeyev
- Proposals and experience for spallation reactions, S. Leray
- Some recent progress in error correction, S. Dunaeva
- From X4 to C4 to a human-readable database: an example of testing X4, A.J. Koning

12:30–14:00 Lunch at VIC restaurant

14:00–17:00 General discussions

- Central repository for currentX4, C4, etc. data collections
- Format conversion tools (X4 to C4, JANIS, NEA comp format codes, Koning's software, others)
- Order: work on all issues continuously or divide into subsets (cross sections, angular distributions, etc.)
- Tests: Statistical
  Nuclear Models
  Volunteers for model code testing
- Insight in available time at NRDC-link to ambitions
- Set milestones

Close

Appendix B

First meeting of WPEC SG30 on

"Quality improvement of EXFOR"

International Atomic Energy Agency (IAEA), Vienna, Austria
10 and 11 October 2007

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