

Nuclear Reaction Data Center (JCPRG)

Faculty of Science, Hokkaido University

Steering Committee

Progress Report to the
IAEA Technical Meeting on the Network of Nuclear Reaction Data Centres
8-10 October, 2007

0. General

“Nuclear Reaction Data Center” was approved as an organisation of Faculty of Science in Hokkaido University and established on April 1, 2007. In addition to nuclear data activities carried out by Japan-Charged Particle Nuclear Reaction Data Group, the center is also interested in evaluation of nuclear reaction data in nucleo-synthesis in the early universe. In order to compile reaction data obtained by unstable nucleus beam at the RIKEN Nishina Center efficiently, the center got research contract with RIKEN Nishina Center. Education of nuclear data physics is also added in the scope of the center. Two JAEA Nuclear Data Centers become visiting professors of the Faculty.

Since the last NRDC meeting (September 2006, Vienna), we have carried out the following activities:

1. Reaction data compilation (NRDF and EXFOR)
2. Conversion from NRDF to EXFOR for old data
3. Bibliography compilation (CINDA)
4. Database maintenance and development (NRDF, EXFOR/ENDF and CINDA)
5. Development of digitization system (GSYS)
6. Customer services

0.1 Staff

Our activities have been carried out by 13 members (7 postdoctoral researchers, 3 graduate students, 2 undergraduate students and 1 technical staff). They have been supervised by the NRDF Steering Committee, which consists of 10 senior researchers (9 nuclear physicists and 1 information scientist). All activities have been coordinated by 1 secretary.

0.2 Budget

The regular JCPRG budget ended at March 2001. We have been applying to the Japanese government for a competitive budget for our further activity. Last year 4 million JPY was allocated for astrophysical application of nuclear data by Nippon Gakujutu Sinkokai (Japan Society for the Promotion of Science; JSPS) and an intensive compilation from doctoral theses have been done..

1. Data Compilation (NRDF and EXFOR)

We are continuing data compilation for charged-particle nuclear reaction data obtained by Japanese accelerators.

1.1 Scope

We are scanning 16 journals for Japanese charged-particle nuclear reaction data compilation: PR/C, PRL, NP/A, PL/B, EPJ/A, NST, JP/G, NIM/A, NIM/B, PTP, JPJ, NSE, ARI, RCA, JRN and JNRS.

1.2 NRDF

From April 2005 to March 2006, CPND in 45 references (453 records, 1.83 MB) have been newly compiled for NRDF. Usually new data are released at the JCPRG web site several months prior to EXFOR.

1.3 EXFOR

Since the 2005 NRDC meeting, we have made 104 new entries and have revised or deleted 142 old entries. These were transmitted as 18 trans files (E039-E048, J005-J006, K001-K002 and R019-R022) to the NDS open area. JCPRG is grateful for valuable comments from Svetlana Dunaeva and Otto Schwerer (NDS), Stanislav Maev (CJD) and Vladimir Varlamov (CDFE) on our transmissions as always.

According to the agreement (Conclusion 2006-4) at the 2006 NRDC meeting, the scope of area K is defined for photonuclear reaction data from Japan. So far 10 entries were made for data measured at Institute for Nuclear Study, Univ. Tokyo (INS) and National Institute of Advanced Industrial Science and Technology (AIST) and two files (TRANS.K001 and K002) were transmitted to the NDS open area.

Author proof of EXFOR compilation has been made by researchers from ATOMKI, Lawrence Berkeley National Laboratory, Tohoku Univ., JAEA, Konan Univ., RIKEN and KEK. Compilation of neutron reaction data is outside our compilation scope in principle. But many corrections to neutron entries were proposed by JCPRG and JAEA, and revised by the four neutron centres.

1.4 Numerical data input from dissertations

An intensive numerical data input have been done by more than 10 undergraduate students of Hokkaido University. These data were shown in tabular form in dissertations which are (partially) published in Journals. About 30 new entries were compiled from these data. In addition, digitized data of about 10 entries are replaced by these authors' data. They were partially transmitted in K002. Submission of all other entries will be included in TRANS.E049 and E050.

1.5 NRDF/EXFOR editor

Entries after 2001 have been compiled and revised by our NRDF/EXFOR editor system (HENDEL) including CHEX.

2. Bibliography Compilation (CINDA)

We have prepared CINDA batches for CPND published in Japan every half year. Each batch covers 6 issues of each of 4 Japanese journals JPJ, PTP, NST and JNRS.

Since 2006 NRDC meeting, two regular batches (49 new lines and 0 modified lines) and a special batch for JENDL-HE2004 (JENDL High Energy File 2004) and JENDL-PD 2004 (JENDL Photonuclear Data File 2004) were prepared and sent to NEA-DB (Reader code J). Bibliographies for neutron induced reaction data in JPJ, PTP, NST and some reports have been compiled by JAEA Nuclear Data Center (Reader code N) as before.

3. Database Maintenance (NRDF, EXFOR/ENDF and CINDA)

We are continuing maintenance and development of database for NRDF, EXFOR/ENDF and CINDA.

3.1 NRDF (<http://www.jcprg.org/nrdf/>)

New web-based NRDF search and plot system on MySQL was released in July, 2007. New compilation, which has been finalized not yet for EXFOR but for NRDF, can be obtained from this site. DARPE (another NRDF search and plot system written by Perl) is also available at <http://www.jcprg.org/darpe/>.

3.2 EXFOR/ENDF (<http://www.jcprg.org/exfor/>)

EXFOR/ENDF search and plot system is available. This system is written by Perl+MySQL and covers JENDL-3.2 and 3.3, ENDF-B/VI.8 and VII.0, JEFF-3.0 and 3.1, BROND-2.2, CENDL-2 as well as EXFOR.

Some web-based utilities were also developed. PENDL (<http://www.jcprg.org/endl/>) can output evaluated data libraries in tabulated form at any temperature and accuracy of interpolation. This is a interface of the ENDF-B Pre-processing codes (PREPRO). Another system RENORM (<http://www.jcprg.org/renorm/>) is a converter from the cross section ratio (e.g. cross section relative to $^{235}\text{U}(n,f)$ cross section) to the absolute cross section and vice versa using evaluated data libraries as reference cross section sets.

3.3 CINDA (<http://www.jcprg.org/cinda/>)

We are developing a new search system of CINDA. This is an extension of EXFOR/ENDF search system mentioned above. A preliminary version of the system is available at <http://www.jcprg.org/cinda/>.

4. Digitization System – GSYS (<http://www.jcprg.org/gsys/>)

A Java-based digitizing system “GSYS” has been updated and released as GSYS Ver.2.2. Main feature implemented on the release was “Automatic Axis Detection” system, which automatically detects and sets the position of axis by easy operation. It reduced operators’ work and the ambiguity of human judgement.

5. XML format for nuclear reaction data

We are interested in description of nuclear reaction data by XML (Extensible Markup Language), which is a common (meta-) format of nuclear reaction data for various libraries (NRDF, EXFOR, ENDF etc.) and enable us to have common bases of softwares.

6. Customer services

We provide Japanese researchers in the fields of nuclear physics and nuclear engineering with nuclear reaction data. For more information, we published “Annual Report of Nuclear Reaction Data File Vol.20” in March 2007 (Japanese + English abstract, <http://www.jcprg.org/annual/annual-e.html>). We have also issued a list of newly added data into EXFOR every month (<http://www.jcprg.org/exfor/info/recentdata.html>) in a CINDA like format.

We have received many comments on EXFOR compilation from Japanese users (mainly JENDL evaluators). These comments have been listed to a table (<http://www.jcprg.org/exfor/info/feedbacks.html>), and forwarded to other centres.

ANNEX: Organization and members of JCPRG

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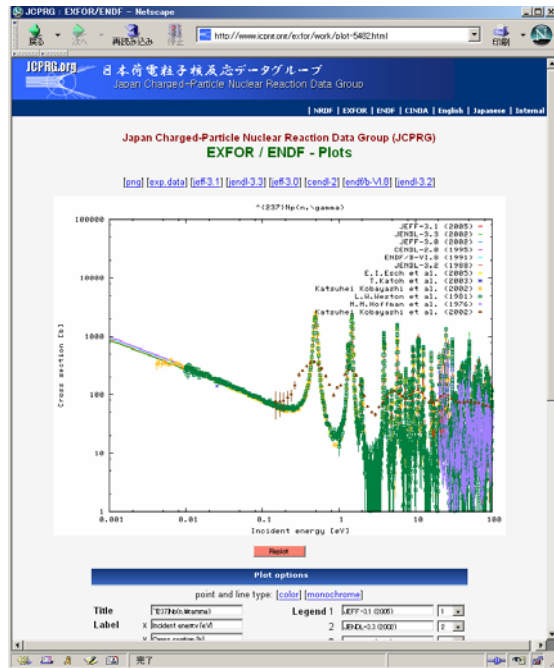
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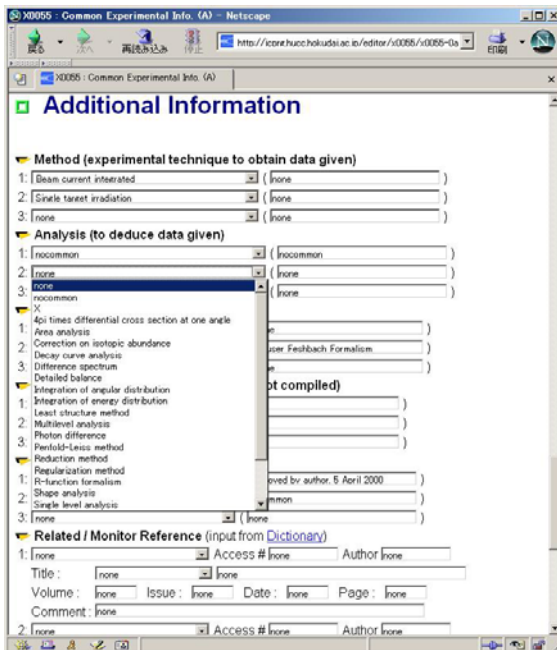
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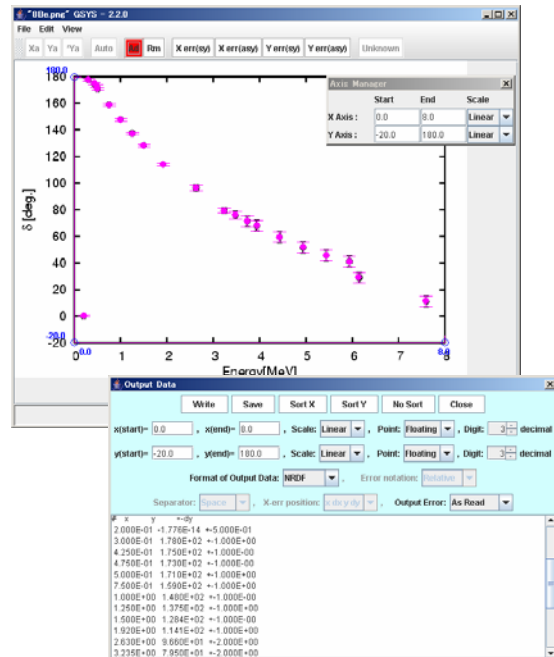
NRDF search/plot (DARPE)
<http://www.jcprg.org/darpe/>



EXFOR/ENDF search/plot
<http://www.jcprg.org/exfor/>



NRDF/EXFOR editor (HENDEL)
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Digitizer (GSYS Ver.2.2)
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