

# Japan Charged-Particle Nuclear Reaction Data Group (JCPRG)

## Nuclear Reaction Data File Steering Committee

Progress Report to the  
IAEA Technical Meeting on the Network of Nuclear Reaction Data Centres  
25-28 September 2006

### **0. General**

Since the last NRDC meeting (October 2005, Vienna), we have carried out the following activities:

1. Data compilation (NRDF and EXFOR)
2. Bibliography compilation (CINDA)
3. Database maintenance and development (NRDF, EXFOR/ENDF and CINDA)
4. Development of digitization system (GSYS)
5. Customer services

### **0.1 Staff**

Our activities have been carried out by 13 group members (6 postdoctoral researchers, 6 graduate students and 1 technical staff). They have been supervised by the NRDF Steering Committee, which consists of 8 senior researchers (7 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. This year 4 million JPY is allocated for astrophysical application of nuclear data by Nippon Gakujutu Sinkokai (Japan Society for the Promotion of Science; JSPS).

## **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. Information of new publications from Svetlana Dunaeva (NDS) are always helpful.

### **1.2 NRDF**

From April 2005 to March 2006, CPND in 40 references (631 records, 1.8 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 73 new entries and have revised or deleted 41 old entries. These were transmitted as 9 trans files (E034-E038, J004 and R016-R018) to the NDS open area. JCPRG is grateful for valuable comments from Otto Schwerer (NDS) on our transmissions as always. Comments on isotope production data from Sandor Takacs (ATOMKI) are also instructive. Some numerical data were

converted from the McGowan data book to NRDF and EXFOR with help of Victoria McLane (NNDC).

According to the agreement (Conclusion 2004-14) at the 2004 NRDC meeting, the scope of area J is defined as “Charged-particle nuclear data for projectile with non-positive baryon number” (See also Action 2004-24, CP-E/053). Since the last NRDC meeting we moved 4 old entries from area E to area J, but no new entry has been made for area J.

Author proof of EXFOR compilation has been made by researchers from Cyclotron Radioisotope Center (CYRIC) of Tohoku University (Sendai), Institute of Nuclear Research of the Hungarian Academy of Sciences (Debrecen) and Lawrence Berkeley National Laboratory (Berkeley). We appreciate their cooperation.

Compilation of Japanese neutron reaction data is outside our compilation scope in principle. But many corrections were proposed by JCPRG and JAEA, and revised by Stanislav Maev (CJD).

#### **1.4 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 2005 NRDC meeting, one batch (9 new lines and 55 modified lines) has been submitted to NEA-DB (Reader code J). Bibliographies for neutron induced reaction data in JPJ, PTP, NST and reports have been compiled by JAEA Nuclear Data Center (Reader code N) as before.

Some old (before 1944) Japanese neutron records included in the draft of the CINDA master file have been checked and corrected by JCPRG in collaboration with Hans Henriksson (NEA-DB).

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

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

### **3.1 NRDF**

NRDF is available at <http://www.jcprg.org/nrdf/>. New data, which have been finalized not yet for EXFOR but for NRDF, can be obtained from this site. This retrieval system is written in a Perl script without any database management system. Now we are planning a new search and plot system which is based on Perl and MySQL.

Table: Annual statistics of NRDF search at <http://www.jcprg.org/nrdf/>

	2003	2004	2005	2006 (Estimation)
# of search (Total)	1870	2000	1340	1540
# of search (Hokkaido U. & JAEA)	1090	750	410	430

### **3.2 EXFOR/ENDF**

JCPRG has developed a new search and plot system for EXFOR/ENDF based on Perl and MySQL. This is available at <http://www.jcprg.org/exfor/>. This system covers JENDL-3.2, JENDL-3.3, ENDF/B-VI, JEFF-30, JEFF-31, 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. Another system RENORM (<http://jcprg.hucc.hokudai.ac.jp/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**

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. Development of Digitization System (GSYS)**

A Java-based digitizing system “GSYS” has been improved after the release of the first version and released as GSYS Ver.2 at <http://jcprg.hucc.hokudai.ac.jp/gsys/gsys-e.html>. User interface and design are entirely revised so that the system is more user-friendly. In addition to writing out of data from the system after digitization, the new version can read numerical data sets before digitization. This function is useful when we have a digitized data set made by an old system and want to improve their quality.

## **5. Customer services**

We provide Japanese researchers in the fields of nuclear physics and nuclear engineering with nuclear data as well as nuclear reaction data (NRDF and EXFOR). For more information, we published “Annual Report of Nuclear Reaction Data File Vol.18” in March 2006 (in Japanese with English abstract). We have also issued a list of newly added data into EXFOR every month (<http://jcprg.hucc.hokudai.ac.jp/exfor/recentdata.html>).

We have received many comments on EXFOR compilation from Japanese users (e.g. JENDL evaluators). These comments have been listed to a table (<http://jcprg.hucc.hokudai.ac.jp/exfor/feedbacks.html>), and forwarded to their respective centres with responsibility.

We have received requests of laboratory reports (coded in REFERENCE record of EXFOR) from Japanese users. We appreciate Dimitri Rochman (NNDC) and Marina Mikhaylyukova (CJD) for their help to obtain reports issued by institutes in area 1 and 4.

## **ANNEX: Organization and members of JCPRG**

### **NRDF Advisory Committee**

Yasuhisa ABE (*Research Center for Nuclear Physics, Osaka Univ., Suita, Osaka*)  
Yoshinori AKAISHI (*RIKEN, Wako, Saitama*)  
Yasuo AOKI (*Univ. of Tsukuba, Tsukuba*)  
Mamoru BABA (*Cyclotron and Radioisotope Center, Tohoku Univ., Sendai*)  
Junsei CHIBA (*Tokyo Univ. of Science, Noda, Chiba*)  
Akira HASEGAWA (*NEA Data Bank, Paris*)  
Kichiji HATANAKA (*Research Center for Nuclear Physics, Osaka Univ., Suita, Osaka*)  
Masayasu ISHIHARA (*RIKEN, Wako, Saitama*)  
Kiyoshi KATŌ (*Hokkaido Univ., Sapporo*)  
Jun-ichi KATAKURA (*Japan Atomic Energy Agency, Tokai*)  
Mitsuji KAWAI (*Kyushu Univ., Fukuoka*)  
Shigeru KUBONO (*Center for Nuclear Study, Univ. of Tokyo, Tokyo*)  
Shunpei MORINOBU (*Research Center for Nuclear Physics, Osaka Univ., Suita, Osaka*)  
Toru MOTOBAYASHI (*RIKEN, Wako, Saitama*)  
Tomofumi NAGAE (*KEK, Tsukuba*)  
Tetsuo NORO (*Kyushu Univ., Fukuoka*)  
Hajime OHNUMA (*Chiba Institute of Technology, Narashino, Chiba*)  
Koichi OKAMOTO (*Japan Atomic Industrial Forum Inc., Tokyo*)  
Hikonojo ORIHARA (*Tohoku Institute of Technology, Sendai*)  
Teijiro SAITOH (*Nuclear Science Laboratory, Tohoku Univ., Sendai*)  
Hajime TANAKA (*Hokkaido Univ., Sapporo*)  
Yoshihiko TENDOW (*RIKEN, Wako, Saitama*)  
Hiroaki UTSUNOMIYA (*Konan Univ., Kobe*)

### **NRDF Steering Committee**

Kiyoshi KATŌ (*Chairman, Hokkaido Univ., Sapporo*)  
Shigeyoshi AOYAMA (*Niigata Univ., Niigata*)  
Masaki CHIBA (*Sapporo-Gakuin Univ. Ebetsu*)  
Yoshiharu HIRABAYASHI (*Hokkaido Univ., Sapporo*)  
Toshiyuki KATAYAMA (*Hokusei-Gakuen Univ., Sapporo*)  
Hiroshi MASUI (*Kitami Institute of Technology, Kitami*)  
Hiroshi NOTO (*Hokusei-Gakuen Univ., Sapporo*)  
Akira OHNISHI (*Hokkaido Univ., Sapporo*)  
Shigeto OKABE (*Hokkaido Univ., Sapporo*)

### **NRDF Annual Report Editorial Committee**

Hiroshi NOTO (*Chairman, Hokusei-Gakuen Univ., Sapporo*)  
Yoshiharu HIRABAYASHI (*Hokkaido Univ., Sapporo*)

## **Staff**

### **1) Data Compilation (NRDF and EXFOR):**

Hiroshi ABE (*Hokkaido Univ., Sapporo*)  
Masayuki AIKAWA (*Université Libre de Bruxelles, Bruxelles*)  
Takako ASHIZAWA (*Hokkaido Univ., Sapporo*)  
Masatsugu ISSE (*Hokkaido Univ., Sapporo*)  
Shin-ya ITO (*Hokkaido Univ., Sapporo*)  
Chie KUROKAWA (*Hokkaido Univ., Sapporo*)  
Hideki MAEKAWA (*Hokkaido Univ., Sapporo*)  
Naohiko OTSUKA (*Japan Atomic Energy Agency, Tokai*)  
Ryusuke SUZUKI (*Hokkaido Univ., Sapporo*)  
Tomoaki TOGASHI (*Hokkaido Univ., Sapporo*)  
Kohsuke TSUBAKIHARA (*Hokkaido Univ., Sapporo*)  
Koji YOSHINO (*Hokkaido Univ., Sapporo*)

### **2) Bibliography Compilation (CINDA):**

Sergei KORENNOV (*Hokkaido Univ., Sapporo*)  
Chie KUROKAWA (*Hokkaido Univ., Sapporo*)  
Naohiko OTSUKA (*Japan Atomic Energy Agency, Tokai*)

### **3) System Maintenance and Development (NRDF, EXFOR/ENDF, CINDA, Digitizer):**

Sergei KORENNOV (*Hokkaido Univ., Sapporo*)  
Naohiko OTSUKA (*Japan Atomic Energy Agency, Tokai*)  
Takuma SUDA (*Univ. of Tokyo, Tokyo*)  
Ryusuke SUZUKI (*Hokkaido Univ., Sapporo*)

### **5) Data Services:**

Naohiko OTSUKA (*Japan Atomic Energy Agency, Tokai*)  
Hitomi YOSHIDA (*Hokkaido Univ., Sapporo*)

## **Secretariat**

Hitomi YOSHIDA (*Hokkaido Univ., Sapporo*)

### **Office address:**

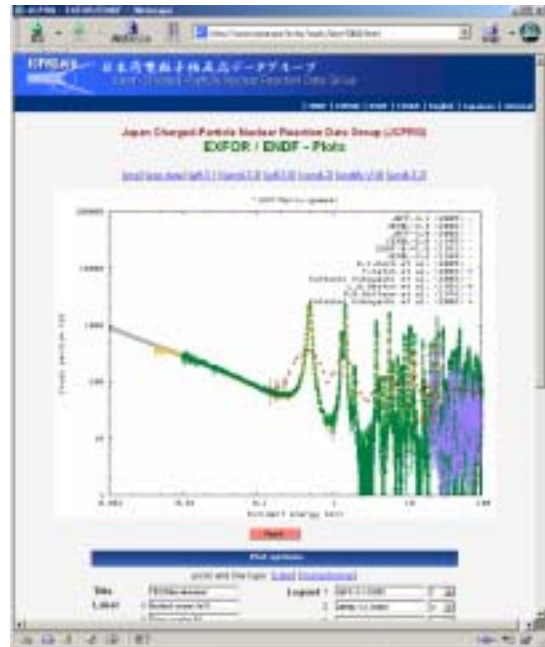
Division of Physics, Graduate School of Science, Hokkaido University  
Kita-10 Nishi-8, 060-0810 Sapporo, Japan  
Telephone / Facsimile: +81(JPN)-11-706-2684  
E-mail: [services@jcprg.org](mailto:services@jcprg.org) Internet: <http://www.jcprg.org/>

## Our Products



**NRDF search/plot (DARPE)**

<http://www.jcprg.org/nrdf/>



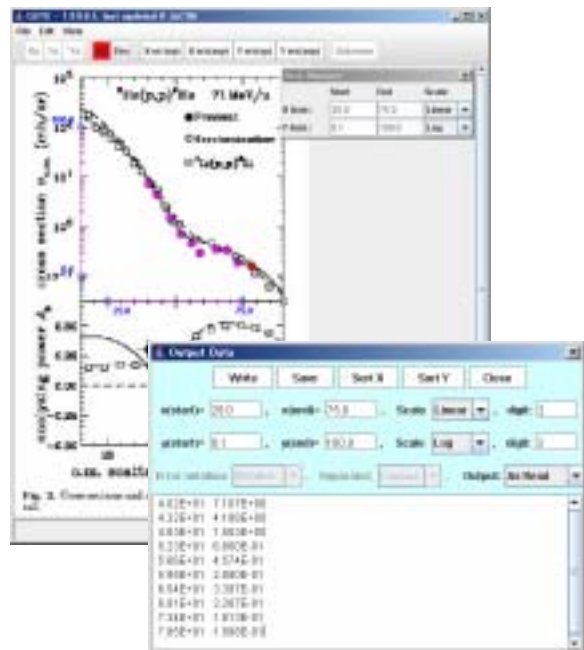
**EXFOR/ENDF search/plot**

<http://www.jcprg.org/exfor/>



**NRDF/EXFOR editor (HENDEL)**

<http://jcprg.hucc.hokudai.ac.jp/editor/>



**Digitizer (GSYS Ver.2)**

<http://jcprg.hucc.hokudai.ac.jp/gsys/gsys-e.html>