

# Hokkaido University Nuclear Reaction Data Centre (JCPRG)

## Progress Report

*Nuclear Reaction Data Centre (JCPRG),  
Faculty of Science, Hokkaido University*

IAEA's Technical Meeting on the  
"International Network of Nuclear Reaction Data Centres"  
April 21-23, 2015

### **0. General**

In this report, we review the activities of Japan Nuclear Reaction Data Centre (JCPRG) since the last NRDC meeting in 2014. Our main objectives are as follows:

- a) Compilation of nuclear reaction data for two databases, NRDF and EXFOR
- b) Evaluation of nuclear reaction data
- c) Development of software and systems
- d) Promotion of collaboration among Asian countries

#### **0.1 Staff**

We have 8 core members (2 professor, 2 seniors and 4 postdoctoral researchers) to perform our activities. The activities are supervised by the JCPRG Steering Committee consisting of 6 professors at Hokkaido University. JCPRG is advised and assessed by the JCPRG Advisory Board consisting of 5 members external to the university.

#### **0.2 Budget**

We receive an annual budget for research and education from Hokkaido University. In addition, Japan Society for the Promotion of Science allocates annual grant of 0.8 million JPY for compilation for five years between Apr. 2013 and Mar. 2018.

#### **0.3 Collaboration**

JCPRG has collaborations with institutes, both inside and outside of Hokkaido University. We collaborate with Meme Media Laboratory in the university to develop some software. As for the collaboration with RIKEN, we advance the compilation of RI beam data performed in RIKEN.

Under the collaboration with JAEA, we cooperate to educate graduate school students and to evaluate nuclear reaction data. The collaboration with ATOMKI has been started from April 2014. In this collaboration, we performed nuclear experiments for medical purposes at RIBF and ATOMKI.

## **1. Compilation**

### **1.1 NRDF**

From April 2014 to March 2015, 22 new papers of charged-particle and photonuclear reaction data have been compiled for NRDF.

### **1.2 EXFOR**

Since the last NRDC meeting, we have transmitted 22 new and 20 revised/deleted entries as 8 trans files (E090-E096, R028) to the NDS open area.

JCPRG is grateful to NRDC colleagues for the valuable comments and suggestions.

**Table 1. EXFOR E-entries transmitted from JCPRG to NDS IAEA.**

TRANS	TRANS Status	ENTRY Tot.	ENTRY New	ENTRY Rev.
E090	Final (2014/7/7)	8	0	8
E091	Final (2014/7/11)	5	4	1
E092	Final (2014/9/17)	9	6	3
E093	Final (2014/9/18)	3	2	1
E094	Final (2015/2/6)	6	6	0
E095	Prelim. (2015/2/17)	4	0	4
E096	Prelim. (2015/3/5)	6	4	2

**Table 2. EXFOR R-entries transmitted from JCPRG to NDS IAEA.**

TRANS	TRANS Status	ENTRY Tot.	ENTRY New	ENTRY Rev.
R028	Prelim. (2015/3/3)	1	0	1

## **2. Evaluation**

We evaluate nuclear reaction data, such as  ${}^6,7\text{Li}+n$  reaction data using Continuum-Discretized Coupled-Channels Method (CDCC) and photonuclear reaction data using a time-dependent mean-field theory. The nuclei ( ${}^8\text{Be}$ ,  ${}^{12}\text{C}$ , etc.) in which the alpha-cluster structure is developing are investigated by the complex scaled orthogonal condition method.

## **3. System Development**

### **3.1 Data Retrieval System**

We have 3 data retrieval systems mentioned below.

- NRDF (<http://www.jcprg.org/nrdf/>)
- NRDF/A (<http://www.jcprg.org/nrdfa/>)
- EXFOR/ENDF (<http://www.jcprg.org/exfor/>)

The relational database management system MySQL has been adopted for the databases to search and retrieve NRDF, EXFOR and ENDF data. For EXFOR, new trans files are copied from the NDS open area, and the MySQL database is updated periodically.

### **3.2 Coding Software**

We have a coding editor and digitizing software applicable for the coding purpose

- Coding editor "HENDEL" (<http://www.jcprg.org/manuals/hendel/>)
- Digitization software "GSYS" (<http://www.jcprg.org/gsys/>)

## **4. Others**

### **4.1 Publication of Annual Report**

The "JCPRG Annual Report 2013" had been published and is available on our website.

### **4.2 JSPS Bilateral Program**

The JSPS Bilateral Program "Measurement and Evaluation of Important Nuclear Data for Diagnosis and Therapy Treatments" with ATOMKI has been implemented from Apr. 2014 (until Mar. 2016).