

Compilation of nuclear reaction data from the RIBF

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Nuclear reaction data, such as cross sections, angular and energy distributions of secondary particles, and resonance parameters, are required to be compiled into a database for their users for a large variety of applications and research fields. A nuclear reaction database that fulfils this requirement is the EXFOR library, which is maintained by the International Atomic Energy Agency (IAEA) and the International Network of Nuclear Reaction Data Centres (NRDC). The NRDC members are involved in data compilation and software development for nuclear data users. Each member is responsible for compiling data about neutrons, charged particles, and photon-induced reactions. This responsibility is assigned to members according to area where the experimental facility to obtain data is located.

One of the NRDC members is the Hokkaido University Nuclear Reaction Data Centre (JCPRG).¹⁾ JCPRG covers nuclear reaction data except neutron-induced data obtained in Japan and contributes about 10% of charged-particle nuclear reaction data in the EXFOR library.²⁾ At the JCPRG, the compiled nuclear reaction data are stored in two databases, NRDF and EXFOR libraries, simultaneously. The former is the original database of JCPRG and the latter is the collaborative one among the NRDC. Both databases are available and searchable online on the JCPRG website.

In addition to the NRDC, we have also collaborated with the RIKEN Nishina Center for data compilation from January 2010 to March 2014. The purpose of this collaboration is to increase the availability of nuclear reaction data produced at the RIBF. The compiled data produced at the RIBF are translated into EXFOR format and available online for the benefit of nuclear data users. In this article, we report on our activities in 2014 concerning the compilation of experimental nuclear reaction data from the RIBF.

In 2014, we compiled 28 new papers, data of which were obtained in Japan. 14 of them contain RIBF data and match the compilation scope of the EXFOR library. 10 papers were published in 2013 and 2014 and their compilation reflects recent activities of the RIBF. On the contrary, the remaining 4 papers were published before 2009 and compiled for completeness of data published by the RIBF. Especially, 2 papers

are written in Chinese and were published in 2005 and 2006. All data are accessible by the accession numbers

Table 1. Entry numbers with references compiled from the RIBF data in 2014

Entries	E2398 ³⁾	E2399 ⁴⁾	E2439 ⁵⁾
	E2440 ⁶⁾	E2442 ⁷⁾	E2443 ⁸⁾
	E2444 ⁹⁾	E2448 ¹⁰⁾	E2450 ¹¹⁾
	E2451 ¹²⁾	E2455 ¹³⁾	E2456 ¹⁴⁾
	E2457 ¹⁵⁾	E2458 ¹⁶⁾	
Total	14		

listed in Table 1. For higher quality of the contents, numerical data are requested from the corresponding authors of the compiled papers. Most of the compiled RIBF data in 2014 are provided by the authors. Such additional information is also available with the list of compiled RIBF data on the JCPRG website.

During the four-year fruitful collaboration, we could establish a good procedure to compile new publications. Therefore, most of recent experimental nuclear reaction data from the RIBF have successfully been compiled in the EXFOR library. As a next step, we are focusing on the improvement of the completeness and usability of the data produced at the RIBF. In addition, we are developing a new data format using XML technology. The new format will allow us to communicate with experimentalists for proofreading compiled information.

References

- 1) <http://www.jcprg.org/>
- 2) <http://www.jcprg.org/exfor/>
- 3) N. Iwasa et al.: Phys. Rev. C **78**, 024306 (2008).
- 4) Z. Elekes et al.: Phys. Rev. C **79**, 011302 (2009).
- 5) M. U. Khandaker et al.: Nucl. Instrum. Methods Phys. Res., Sect. B **316**, 33 (2013).
- 6) S. J. Jin et al.: Phys. Rev. C **88**, 035801 (2013).
- 7) G. L. Zhang et al.: High Energy Physics and Nuclear Physics, **29**, 940 (2005) (in Chinese).
- 8) D. Y. Pang et al.: High Energy Physics and Nuclear Physics, **30**, 22 (2006) (in Chinese).
- 9) L. Audirac et al.: Phys. Rev. C **88**, 041602 (2013).
- 10) Y. Satou et al.: Phys. Lett. B **728**, 462 (2014).
- 11) H. Haba et al.: Phys. Rev. C **89**, 024618 (2014).
- 12) T. Nakamura et al.: Phys. Rev. Lett. **112**, 142501 (2014).
- 13) A. Ozawa et al.: Phys. Rev. C **89**, 044602 (2014).
- 14) S. Michimasa et al.: Phys. Rev. C **89**, 054307 (2014).
- 15) M. U. Khandaker et al.: Nucl. Instrum. Methods Phys. Res., Sect. B **335**, 8 (2014).
- 16) N. Kobayashi et al.: Phys. Rev. Lett. **112**, 242501 (2014).

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