

Compilation of nuclear reaction data from RIBF

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Nuclear data, e.g. cross sections, half-lives, and decay radiation properties, can be obtained through scientific investigation of nuclear properties and reactions. The results of experimental measurements of different nuclear reaction data are distributed in various publications and hence are difficult for users to access. Therefore, there is a need to compile the data into a database. One of the database is the EXFOR library, which is maintained by the International Network of Nuclear Reaction Data Centres (NRDC) under the auspices of the International Atomic Energy Agency (IAEA). As one of the NRDC members, the Hokkaido University Nuclear Reaction Data Centre (JCPRG)¹⁾ has contributed about 10 percent of the data on charged-particle nuclear reactions in the EXFOR library.

JCPRG compiles and accumulates charged-particle data obtained in Japanese facilities in their own database NRDF. The compiled nuclear reaction data is available through the online search system of the NRDF and the EXFOR library²⁾. In addition to the collaboration with the NRDC network, JCPRG established a collaborative research contract with the RIKEN Nishina Center in 2010, to increase the availability of the nuclear reaction data produced at the RIBF. The compiled files of the nuclear data produced at the RIBF are translated to the EXFOR format for the benefit of nuclear data users. We have addressed a smooth and high-quality compilation of the RIBF data as one of the important tasks in this collaboration. This write-up provides a brief overview of the JCPRG compilation activity in 2013 regarding experimental nuclear reaction data produced at the RIBF.

Among the papers compiled in 2013, thirteen contained RIBF data in the compilation scope of the EXFOR library, out of which eight papers^{3–10)} published in 2013 had already been registered on the EXFOR library. Five papers published in 2012^{11–15)} had also been registered on the EXFOR library in 2013. The data can be easily accessed from the EXFOR search system²⁾ by using the accession numbers given in Table 1. The list of RIBF data compiled into the EXFOR library is also available on the JCPRG website¹⁾ along with additional information.

To ensure a high-quality database, we ask authors to provide the original data plotted in each figure so

that the data compiled in the NRDF and the EXFOR library are accurate. If the original data could not be obtained from the corresponding author, we digitized numerical data from the plotted figures using the digitization software GSYS. If we receive the original numerical data in the future, we will replace the digitized data with the original data. We also correspond with the authors about inquiries for data, error, and experiments as necessary. The numerical data for almost all of the EXFOR entries compiled in 2013 were proofread by authors, and a detailed description of the entries has been revised according to the authors' comments.

Table 1. Entry numbers with references compiled in 2013

	2012		2013	
Entries	E2384 ¹¹⁾	E2416 ¹⁵⁾	E2404 ³⁾	E2430 ⁷⁾
	E2888 ¹²⁾		E2405 ⁴⁾	E2431 ⁸⁾
	E2391 ¹³⁾		E2406 ⁵⁾	E2434 ⁹⁾
	E2401 ¹⁴⁾		E2407 ⁶⁾	E2438 ¹⁰⁾
Total	5		8	

As a result of the collaboration for four years, most of the compilation process was well established and is working well as reported above. We are continuously making efforts to improve the completeness and usability of the experimental nuclear reaction data produced at the RIBF. For such improvements, the first JCPRG-RNC joint workshop on nuclear data was held on August 8-9, 2013¹⁶⁾. The workshop was helpful for understanding the present and future status of the RIKEN-JCPRG research collaboration and related nuclear data activities.

References

- 1) <http://www.jcprg.org/>
- 2) <http://www.jcprg.org/exfor/>
- 3) M. U. Khandaker et al.: Nucl. Instrum. Methods Phys. Res. B **296** (2013) 14.
- 4) B. Guo et al.: Phys. Rev. C **87** (2013) 015803.
- 5) T. Sumita et al.: J. Phys. Soc. Jpn. **82** (2013) 024202.
- 6) S. Sakaguchi et al.: Phys. Rev. C **87** (2013) 021601(R).
- 7) A. K. Kurilkin et al.: Phys. Rev. C **87** (2013) 051001.
- 8) H. Yamaguchi et al.: Phys. Rev. C **87** (2013) 034303.
- 9) J. J. He et al.: Phys. Rev. C **88** (2013) 012801.
- 10) M. Murakami et al.: Phys. Rev. C **88** (2013) 024618.
- 11) K. Tshoo et al.: Phys. Rev. Lett. **109** (2012) 022501.
- 12) K. Morita et al.: J. Phys. Soc. Jpn. **81** (2012) 103201.
- 13) S. Takeuchi et al.: Phys. Rev. Lett. **109** (2012) 182501.
- 14) N. Kobayashi et al.: Phys. Rev. C **88** (2012) 054604.
- 15) LI Kuo-Ang et al.: Chin. Phys. Lett. **29** (2012) 102301.
- 16) M. Aikawa et al.: in this report.

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