

Database of radioactive isotopes produced at the BigRIPS separator

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We have been developing a database of radioactive isotopes (RI) produced at the BigRIPS separator¹⁾. The RI database entries include the following information:

- Production cross section
- Production yield
- Calculated value by LISE⁺⁺ code²⁾
- Experimental conditions
 - Primary beam
 - Target
 - Device settings
 - Magnetic rigidities
 - Measurement date
- Publication list
 - Title
 - Journal
 - First author
 - Journal digital object identifier (DOI)
 - Produced RI beam(s)
- Isomeric nucleus
 - Gamma ray energy
 - Half life

All entries are stored in a relational database that is based on Microsoft Access 2010.

The RI database is synchronized with a web site. The web site is coded using PHP. The top panel of Fig. 1 shows the web interface of the RI database. The RI database consists of nuclides, which includes RIs produced at the BigRIPS separator. RIs differentiated using red color text. The bottom panel of Fig. 1 shows an example, ¹²⁸Pd isotope. The production cross section and yield together with calculated value by LISE⁺⁺ code are listed. Two journals about ¹²⁸Pd are also shown there. The detailed BigRIPS setting for ¹²⁸Pd can be accessed through the hyperlinked ID value, 80.

This web site also has a retrieval interface. This search allows a Boolean AND search over several categories (mass number *A*, atomic number *Z*, neutron number *N*, and so on). The results of search are listed on the user's browser. Furthermore, the cross section file for LISE⁺⁺ and figures of production cross sections and production yields can be obtained from the search results.

The RI database and its web site assist on RIBF user to design RI beam experiments using the BigRIPS separator. Work on the system is currently ongoing and it is planned for practical implementation in the near future.

¹²¹ Sb	¹²² Sb	¹²³ Sb	¹²⁴ Sb	¹²⁵ Sb	¹²⁶ Sb	¹²⁷ Sb	¹²⁸ Sb	¹²⁹ Sb	¹³⁰ Sb	¹³¹ Sb	¹³² Sb	¹³³ Sb
¹²⁰ Sn	¹²¹ Sn	¹²² Sn	¹²³ Sn	¹²⁴ Sn	¹²⁵ Sn	¹²⁶ Sn	¹²⁷ Sn	¹²⁸ Sn	¹²⁹ Sn	¹³⁰ Sn	¹³¹ Sn	¹³² Sn
¹¹⁹ In	¹²⁰ In	¹²¹ In	¹²² In	¹²³ In	¹²⁴ In	¹²⁵ In	¹²⁶ In	¹²⁷ In	¹²⁸ In	¹²⁹ In	¹³⁰ In	¹³¹ In
¹¹⁸ Cd	¹¹⁹ Cd	¹²⁰ Cd	¹²¹ Cd	¹²² Cd	¹²³ Cd	¹²⁴ Cd	¹²⁵ Cd	¹²⁶ Cd	¹²⁷ Cd	¹²⁸ Cd	¹²⁹ Cd	¹³⁰ Cd
¹¹⁷ Ag	¹¹⁸ Ag	¹¹⁹ Ag	¹²⁰ Ag	¹²¹ Ag	¹²² Ag	¹²³ Ag	¹²⁴ Ag	¹²⁵ Ag	¹²⁶ Ag	¹²⁷ Ag	¹²⁸ Ag	¹²⁹ Ag
¹¹⁶ Pd	¹¹⁷ Pd	¹¹⁸ Pd	¹¹⁹ Pd	¹²⁰ Pd	¹²¹ Pd	¹²² Pd	¹²³ Pd	¹²⁴ Pd	¹²⁵ Pd	¹²⁶ Pd	¹²⁷ Pd	¹²⁸ Pd
¹¹⁵ Rh	¹¹⁶ Rh	¹¹⁷ Rh	¹¹⁸ Rh	¹¹⁹ Rh	¹²⁰ Rh	¹²¹ Rh	¹²² Rh	¹²³ Rh	¹²⁴ Rh	¹²⁵ Rh	¹²⁶ Rh	¹²⁷ Rh

¹²⁸Pd Palladium
Z = 46 N = 82

ID ¹	Cross section (exp) [mb]	Error ² [mb]	LISE ⁺⁺ [mb]	Measurement date	Yield [pps/pnA]	Beam
80	1.17e-8	3.26e-9	1.43e-8	2008-11-21	5.49e-4	238U 345MeV

Publication

Title	Journal	First Author
Isomers in ¹²⁸ Pd and ¹²⁸ Pd: Evidence for a Robust Shell Closure at the Neutron Magic Number 82 in Exotic Palladium Isotopes	Phys. Rev. Lett. 111 (2013) 152501	H. Watanabe
Identification of 45 New Neutron-Rich Isotopes Produced by In-Flight Fission of a 238U Beam at 345 MeV/nucleon	J. Phys. Soc. Jpn. 79 (2010) 073201	T. Ohnishi

Fig.1. Web interface. The upper panel shows nuclides. Cyan, pale green, and yellow indicate nuclei, isomers, and new isotopes produced at the BigRIPS separator. The production cross section and production yield for the nucleus of interest can be accessed through the hyperlinked site. The lower panel shows an example of ¹²⁸Pd isotope. The production cross sections and production yields together with the BigRIPS setting are listed. Two journals about ¹²⁸Pd are also shown.

References

- 1) T. Kubo et al.: Nucl. Instr. and Meth. **B 204**, 97 (2003).
- 2) O.B. Tarasov and D. Bazin: LISE⁺⁺ site, <http://lise.nsl.edu>, Michigan State University.

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