

## Research Facility Development Division

### Research Instruments Group

### BigRIPS Team

#### 1. Abstract

This team is in charge of design, construction, development and operation of BigRIPS in-flight separator and its related research instruments at RI beam factory (RIBF). They are employed not only for the production of RI beams but also the experimental studies using RI beams.

#### 2. Major Research Subjects

Design, construction, development and operation of BigRIPS in-flight separator, RI-beam transport lines, and their related research instruments.

#### 3. Summary of Research Activity

This team is in charge of design, construction, development and operation of BigRIPS in-flight separator, RI-beam transport lines, and their related research instruments such as ZeroDegree spectrometer at RI beam factory (RIBF). They are employed not only for the production of RI beams but also various kinds of experimental studies using RI beams. The research subjects may be summarized as follows:

- (1) General studies on RI-beam production using in-flight scheme.
- (2) Studies on ion-optics of in-flight separators, including particle identification of RI beams.
- (3) Simulation and optimization of RI-beam production.
- (4) Development of beam-line detectors and their data acquisition system.
- (5) Experimental studies on production reactions and unstable nuclei.
- (6) Experimental studies of the limits of nuclear binding.
- (7) Development of superconducting magnets and their helium cryogenic systems.
- (8) Development of a high-power production target system.
- (9) Development of a high-power beam dump system.
- (10) Development of a remote maintenance and remote handling systems.
- (11) Operation, maintenance and improvement of BigRIPS separator system, RI-beam transport lines, and their related research instruments such as ZeroDegree spectrometer and so on.
- (12) Experimental research using RI beams.

#### Members

##### Team Leader

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##### Research/Technical Scientists

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## List of Publications & Presentations

### Publications

#### [Original Papers]

- V. Vaquero, A. Jungclauss, T. Aumann, J. Tscheuschner, E. V. Litvinova, J. A. Tostevin, H. Baba, D. S. Ahn, R. Avigo, K. Boretzky, A. Bracco, C. Caesar, F. Camera, S. Chen, V. Derya, P. Doornenbal, J. Endres, N. Fukuda, U. Garg, A. Giaz, M. N. Harakeh, M. Heil, A. Horvat, K. Ieki, N. Imai, N. Inabe, N. Kalantar-Nayestanaki, N. Kobayashi, Y. Kondo, S. Koyama, T. Kubo, I. Martel, M. Matsushita, B. Million, T. Motobayashi, T. Nakamura, N. Nakatsuka, M. Nishimura, S. Ota, H. Otsu, T. Ozaki, M. Petri, R. Reifarth, J. L. Rodríguez-Sánchez, D. Rossi, A. T. Saito, H. Sakurai, D. Savran, H. Scheit, F. Schindler, P. Schrock, D. Semmler, Y. Shiga, M. Shikata, Y. Shimizu, H. Simon, D. Steppenbeck, H. Suzuki, T. Sumikama, D. Symochko, I. Syndikus, H. Takeda, S. Takeuchi, R. Taniuchi, Y. Togano, J. Tsubota, H. Wang, O. Wieland, K. Yoneda, J. Zenihiro, and A. Zilges, “Fragmentation of single-particle strength around the doubly magic nucleus  $^{132}\text{Sn}$  and the position of the  $0f_{5/2}$  proton-hole state in  $^{131}\text{In}$ ,” *Phys. Rev. Lett.* **124**, 022501 (2020).
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### [Proceedings]

- K. Kusaka, “Long term operation of the superconducting triplet quadrupoles with cryocoolers,” *J. Phys. Conf. Ser.* **1559**, 012071 (2020).

## Presentations

### [International Conferences/Workshops]

- N. Fukuda, “Present status of the BigRIPS separator and recent development of RI-beam production,” RIBF Users Meeting 2020, Virtual Conference (Zoom), September 09, 2020.
- H. Takeda, “RI beam production in RIBF from the perspective of nuclear reaction,” JSPS/NRF/NSFC A3 Foresight Program “Nuclear physics in the 21st century” Joint Annual Meeting, Online Conference, November 18, 2020.
- N. Fukuda (invited), “Particle identification at BigRIPS separator,” Workshop on Techniques and Detectors for Heavy-ion Charge-State Identification in High-acceptance Spectrometers, Virtual Conference (Zoom), December 16–17, 2020.