

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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List of Publications & Presentations**Publications****[Original Papers]**

- Y. Shimizu, T. Kubo, T. Sumikama, N. Fukuda, H. Takeda, H. Suzuki, D. S. Ahn, N. Inabe, K. Kusaka, M. Ohtake, Y. Yanagisawa, K. Yoshida, Y. Ichikawa, T. Isobe, H. Otsu, H. Sato, T. Sonoda, D. Murai, N. Iwasa, N. Imai, Y. Hirayama, S. C. Jeong, S. Kimura, H. Miyatake, M. Mukai, D. G. Kim, E. Kim, and A. Yagi, “Production of new neutron-rich isotopes near the $N = 60$ isotones ^{92}Ge and ^{93}As by in-flight fission of a 345 MeV/nucleon ^{238}U beam,” *Phys. Rev. C* **109**, 044313 (2024).
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Presentations

[International Conferences/Workshops]

- H. Suzuki (invited), “RI-beam production at RIBF, RIKEN—Recent New isotopes and Production cross sections—,” 2024 Annual Meeting of A3 Foresight, Daejeon, Korea, July 17–20, 2024.
- S. Michimasa (invited), “Researches for Pioneering insights of RI productions—Promotion at BigRIPS,” Korea-Japan Symposium on TOPTIER Platform in Extreme Rare Isotope Science, Seoul National University, Seoul, Korea December 15–17, 2024.
- H. Suzuki (invited), “Experimental Study for the production mechanism of RI beams—Production of proton-rich RIs from the ^{78}Kr beam—,” RCNP-CENuM-OMEG Symposium on Nuclear Structure, Reaction, and Astrophysics (NuSRAP2024), Osaka, Japan, December 18–20, 2024.
- S. Michimasa (invited), “Overviews of recent activities at BigRIPS,” The 8th International Expert Meeting on Challenging Issues of

Next-generation High-Intensity In-flight Separators, RIKEN Nishina Center, Wako, Japan, January 14–16, 2025.

- N. Fukuda (invited), “Current status and technical issues in High-Z beam production and particle identification at BigRIPS,” The 8th International Expert Meeting on Challenging Issues of Next-generation High-Intensity In-flight Separators, RIKEN Nishina Center, Wako, Japan, January 14–16, 2025.
- M. Yoshimoto (invited), “Xenon-gas ionization chamber for High-Z beams,” The 8th International Expert Meeting on Challenging Issues of Next-generation High-Intensity In-flight Separators, RIKEN Nishina Center, Wako, Japan, January 14–16, 2025.
- Y. Togano (invited), “High-power beam dump for BigRIPS,” The 8th International Expert Meeting on Challenging Issues of Next-generation High-Intensity In-flight Separators, RIKEN Nishina Center, Wako, Japan, January 14–16, 2025.
- H. Suzuki (invited), “Measurement for cross sections and momentum distributions of RIs produced from a ^{78}Kr beam,” The 8th International Expert Meeting on Challenging Issues of Next-generation High-Intensity In-flight Separators, RIKEN Nishina Center, Wako, Japan, January 14–16, 2025.
- K. Kusaka (invited), “Operational experiences of BigRIPS magnets and cryogenic systems,” The 8th International Expert Meeting on Challenging Issues of Next-generation High-Intensity In-flight Separators, RIKEN Nishina Center, Wako, Japan, January 14–16, 2025.
- H. Takeda (invited), “Development of ion-optics at BigRIPS,” The 8th International Expert Meeting on Challenging Issues of Next-generation High-Intensity In-flight Separators, RIKEN Nishina Center, Wako, Japan, January 14–16, 2025.
- Y. Shimizu (invited), “Safety operation experience for high-power in-flight separator,” The 8th International Expert Meeting on Challenging Issues of Next-generation High-Intensity In-flight Separators, RIKEN Nishina Center, Wako, Japan, January 14–16, 2025.
- M. Yoshimoto (invited), “RI-beam production and recent advancements in the BigRIPS,” RIBF Users Meeting 2025, RIKEN Nishina Center, Wako, Japan, January 21, 2025.
- S. Michimasa (invited), “Present and next step of BigRIPS separator,” Advancing Physics at Next RIBF (ADRIB2025), RIKEN Nishina Center, Wako, Japan, January 22, 2025.

[Domestic Conference/Workshop]

梶野泰宏 (招待講演), 「逆運動学を用いた電気双極子状態の崩壊測定」, 核反応の時間発展ダイナミクスの解明に向けて, 和光市 (理化学研究所), 2024 年 9 月 25–26 日.