

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]

- T. Pohl, Y. L. Sun, A. Obertelli, J. Lee, M. Gómez-Ramos, K. Ogata, K. Yoshida, B. S. Cai, C. X. Yuan, B. A. Brown, H. Baba, D. Beaumel, A. Corsi, J. Gao, J. Gibelin, A. Gillibert, K. I. Hahn, T. Isobe, D. Kim, Y. Kondo, T. Kobayashi, Y. Kubota, P. Li, P. Liang, H. N. Liu, J. Liu, T. Lokotko, F. M. Marques, Y. Matsuda, T. Motobayashi, T. Nakamura, N. A. Orr, H. Otsu, V. Panin, S. Y. Park, S. Sakaguchi, M. Sasano, H. Sato, H. Sakurai, Y. Shimizu, A. I. Stefanescu, L. Stuhl, D. Suzuki, Y. Togano, D. Tudor, T. Uesaka, H. Wang, X. Xu, Z. H. Yang, K. Yoneda, and J. Zenihiro, "Multiple mechanisms in proton-induced nucleon removal at ~ 100 MeV/nucleon," *Phys. Rev. Lett.* **130**, 172501 (2023).
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- L. Stuhl, M. Sasano, J. Gao, Y. Hirai, K. Yako, T. Wakasa, D. S. Ahn, H. Baba, A. I. Chilug, S. Franchoo, Y. Fujino, N. Fukuda, J. Gibelin, I. S. Hahn, Z. Halasz, T. Harada, M. N. Harakeh, D. Inomoto, T. Isobe, H. Kasahara, D. Kim, G. G. Kiss, T. Kobayashi, Y. Kondo, Z. Korkulu, S. Koyama, Y. Kubota, A. Kurihara, H. N. Liu, M. Matsumoto, S. Michimasa, H. Miki, M. Miwa, T. Motobayashi, T. Nakamura, M. Nishimura, H. Otsu, V. Panin, S. Park, A. T. Saito, H. Sakai, H. Sato, T. Shimada, Y. Shimizu, S. Shimoura, A. Spiridon, I. C. Stefanescu, X. Sun, Y. L. Sun, H. Suzuki, E. Takada, Y. Togano, T. Tomai, L. Trache, D. Tudor, T. Uesaka, H. Yamada, Z. Yang, M. Yasuda, K. Yoneda, K. Yoshida, J. Zenihiro, and N. Zhang, “Study of Gamow-Teller giant resonance in ^{11}Li drip-line nucleus,” *Il Nuovo Cimento* **47 C**, 39 (2024).

Presentations

[International Conferences/Workshops]

- H. Suzuki (invited), “Determination of the neutron dripline at F and Ne & discovery of the heaviest Na Isotope: ^{39}Na ,” *Advances in Radioactive Isotope Science (ARIS2023)*, Avignon, France, June 4–9, 2023.
- Y. Togano (oral), “Electric dipole response of ^{52}Ca —low-lying dipole strength—,” 7th International Conference on Collective Motion in Nuclear under Extreme Conditions (COMEX7), Catania, Italy, June 11–16, 2023.
- Y. Togano (invited), “CsI(Na) array CATANA to measure protons and gamma-rays,” *Direct reactions and spectroscopy with hydrogen targets: post 10 years at the RIBF and future prospects*, York, United Kingdom, July 31–August 4, 2023.
- K. Kusaka (poster), “Long term operation of superconducting triplet quadrupoles with cryocoolers,” 16th European Conference on Ap-

plied Superconductivity (EUCAS2023), Bologna, Italy, September 3–7, 2023.

- Y. Togano (invited), “Electric dipole response of exotic nuclei studied by virtual photon scattering,” The Fourth International Conference on Nuclear Photonics (Nuclear Photonics 2023), Durham, USA, September 11–15, 2023.
- H. Suzuki (invited), “Studies of the two-step schemes for new RI-beam production in the medium-heavy very-neutron-rich region,” Sixth Joint Meeting of the Nuclear Physics Divisions of the APS and JPS (HAWAII2023), Waikoloa, Hawaii, USA, November 26–December 1, 2023.
- M. Yoshimoto (invited), “Xenon-gas ionization chamber for improving high-Z beam particle identification,” Sixth Joint Meeting of the Nuclear Physics Divisions of the APS and JPS (HAWAII2023), Waikoloa, Hawaii, USA, November 26–December 1, 2023.
- M. Yoshimoto (invited), “RI beam production and extension to high-Z beam at BigRIPS,” 2023 Annual Meeting of JSPS/NRF NSFC A3 Foresight Program, “Nuclear Physics in the 21st Century,” Xi’an, China, November 30–December 2, 2023.
- H. Suzuki (invited), “Upgrade projects for BigRIPS & Studies for the production mechanism of RI beams,” Advancing Physics at Next RIBF (ADRIB24), Wako, Japan, January 23–24, 2024.
- H. Suzuki (invited), “Collaborations for future studies using the RI-beam in-flight separators at RIBF and RAON,” 3rd RIKEN-IBS Joint Conference on Nuclear Physics, Wako, Japan, January 25–26, 2024.

Award

吉本雅浩, 理化学研究所 2023 年度 理研桜舞賞, 「Development of new ionization chamber specialized for high Z beam」, 2024 年 3 月 12 日.