

**Research Facility Development Division**  
**Research Instruments Group**  
**Detector Team**

### 1. Abstract

This team is in charge of development, fabrication, and operation of various detectors used for nuclear physics experiments at RIBF. Our current main mission is maintenance and improvement of detectors which are used at BigRIPS separator and its succeeding beam lines for beam diagnosis and particle identification of RI beams. We are also engaged in R&D of new detectors that can be used for higher-intensity RI beams. In addition, we are doing the R&D which uses the pelletron accelerator together with other groups.

### 2. Major Research Subjects

Development, fabrication, and operation of various detectors for nuclear physics experiments, including beam-line detectors which are used for the production and delivery of RI beams (beam diagnosis and particle identification). R&D which uses the pelletron accelerator.

### 3. Summary of Research Activity

The current research subjects are summarized as follows:

- (1) Maintenance and improvement of the beam-line detectors which are used at BigRIPS separator and its succeeding beam lines.
- (2) Development of new beam-line detectors with radiation hardness and tolerance for higher counting rates.
- (3) Management of the pelletron accelerator and R&D which uses the pelletron.

## Members

#### Team Leader

Hiromi SATO

#### Research/Technical Scientist

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#### Research Consultant

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#### Student Trainees

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## List of Publications & Presentations

### Publications

#### [Original Papers]

- A. Revel, O. Sorlin, F. M. Marqués, Y. Kondo, J. Kahlbow, T. Nakamura, N. A. Orr, F. Nowacki, J. A. Tostevin, C. X. Yuan, N. L. Achouri, H. Al Falou, L. Atar, T. Aumann, H. Baba, K. Boretzky, C. Caesar, D. Calvet, H. Chae, N. Chiga, A. Corsi, H. L. Crawford, F. Delaunay, A. Delbart, Q. Deshayes, Z. Dombrádi, C. A. Douma, Z. Elekes, P. Fallon, I. Gašparić, J. -M. Gheller, J. Gibelin, A. Gillibert, M. N. Harakeh, W. He, A. Hirayama, C. R. Hoffman, M. Holl, A. Horvat, Á. Horváth, J. W. Hwang, T. Isobe, N. Kalantar-Nayestanaki, S. Kawase, S. Kim, K. Kisamori, T. Kobayashi, D. Körper, S. Koyama, I. Kuti, V. Lapoux, S. Lindberg, S. Masuoka, J. Mayer, K. Miki, T. Murakami, M. Najafi, K. Nakano, N. Nakatsuka, T. Nilsson, A. Obertelli, F. de Oliveira Santos, H. Otsu, T. Ozaki, V. Panin, S. Paschalis, D. Rossi, A. T. Saito, T. Saito, M. Sasano, H. Sato, Y. Satou, H. Scheit, F. Schindler, P. Schrock, M. Shikata, Y. Shimizu, H. Simon, D. Soehler, L. Stuhl, S. Takeuchi, M. Tanaka, M. Thoennessen, H. Törnqvist, Y. Togano, T. Tomai, J. Tscheuschner, J. Tsubota, T. Uesaka, Z. Yang, M. Yasuda, and K. Yoneda, "Extending the southern shore of the island of inversion to  $^{28}\text{F}$ ," *Phys. Rev. Lett.* **124**, 152502 (2020).
- K. J. Cook, T. Nakamura, Y. Kondo, K. Hagino, K. Ogata, A. T. Saito, N. L. Achouri, T. Aumann, H. Baba, F. Delaunay, Q. Deshayes, P. Doornenbal, N. Fukuda, J. Gibelin, J. W. Hwang, N. Inabe, T. Isobe, D. Kameda, D. Kanno, S. Kim, N. Kobayashi, T. Kobayashi, T. Kubo, S. Leblond, J. Lee, F. M. Marqués, R. Minakata, T. Motobayashi, K. Muto, T. Murakami, D. Murai, T. Nakashima, N. Nakatsuka, A. Navin, S. Nishi, S. Ogoshi, N. A. Orr, H. Otsu, H. Sato, Y. Satou, Y. Shimizu, H. Suzuki, K. Takahashi, H. Takeda, S. Takeuchi, R. Tanaka, Y. Togano, J. Tsubota, A. G. Tuff, M. Vandebrouck, and K. Yoneda, "Halo structure of the neutron-dripline nucleus  $^{19}\text{B}$ ," *Phys. Rev. Lett.* **124**, 212503 (2020).

- G. Jhang, J. Estee, J. Barney, G. Cerizza, M. Kaneko, J. W. Lee, W. G. Lynch, T. Isobe, M. Kurata-Nishimura, T. Murakami, C. Y. Tsang, M. B. Tsang, R. Wang, D. S. Ahn, L. Atar, T. Aumann, H. Baba, K. Boretzky, J. Brzychczyk, N. Chiga, N. Fukuda, I. Gasparic, B. Hong, A. Horvat, K. Ieki, N. Inabe, Y. J. Kim, T. Kobayashi, Y. Kondo, P. Lasko, H. S. Lee, Y. Leifels, J. Lukasik, J. Manfredi, A. B. McIntosh, P. Morfouace, T. Nakamura, N. Nakatsuka, S. Nishimura, R. Olsen, H. Otsu, P. Pawlowski, K. Pelczar, D. Rossi, H. Sakurai, C. Santamaria, H. Sato, H. Scheit, R. Shane, Y. Shimizu, H. Simon, A. Snoch, A. Sochocka, Z. Sosin, T. Sumikama, H. Suzuki, D. Suzuki, H. Takeda, S. Tangwancharoen, H. Toernqvist, Y. Togano, Z. G. Xiao, S. J. Yennello, J. Yurkon, Y. Zhang, the S $\pi$ RIT Collaboration, M. Colonna, D. Cozma, P. Danielewicz, H. Elfner, N. Ikeno, C. M. Ko, J. Mohs, D. Oliinychenko, A. Ono, J. Suae, Y. J. Wang, H. Wolter, J. Xu, Y. -X. Zhang, Z. Zhang, the TMEP collaboration, "Symmetry energy investigation with pion production from Sn + Sn systems," *Phys. Lett. B* **813**, 136016 (2021).
- Y. Kubota, A. Corsi, G. Authelet, H. Baba, C. Caesar, D. Calvet, A. Delbart, M. Dozono, J. Feng, F. Flavigny, J. -M. Gheller, J. Gibelin, A. Giganon, A. Gillibert, K. Hasegawa, T. Isobe, Y. Kanaya, S. Kawakami, D. Kim, Y. Kikuchi, Y. Kiyokawa, M. Kobayashi, N. Kobayashi, T. Kobayashi, Y. Kondo, Z. Korkulu, S. Koyama, V. Lapoux, Y. Maeda, F. M. Marqués, T. Motobayashi, T. Miyazaki, T. Nakamura, N. Nakatsuka, Y. Nishio, A. Obertelli, K. Ogata, A. Ohkura, N. A. Orr, S. Ota, H. Otsu, T. Ozaki, V. Panin, S. Paschalis, E. C. Pollacco, S. Reichert, J. -Y. Roussé, A. T. Saito, S. Sakaguchi, M. Sako, C. Santamaria, M. Sasano, H. Sato, M. Shikata, Y. Shimizu, Y. Shindo, L. Stuhl, T. Sumikama, Y. L. Sun, M. Tabata, Y. Togano, J. Tsubota, Z. H. Yang, J. Yasuda, K. Yoneda, J. Zenihiro, and T. Uesaka, "Surface localization of the dineutron in  $^{11}\text{Li}$ ," *Phys. Rev. Lett.* **125**, 252501 (2020).
- H. Suzuki, K. Yoshida, N. Fukuda, H. Takeda, Y. Shimizu, D. S. Ahn, T. Sumikama, N. Inabe, T. Komatsubara, H. Sato, Z. Korkulu, K. Kusaka, Y. Yanagisawa, M. Ohtake, H. Ueno, T. Kubo, S. Michimasa, N. Kitamura, K. Kawata, N. Imai, O. B. Tarasov, D. Bazin, J. Nolen, and W. F. Henning, "Experimental studies of the two-step scheme with an intense radioactive  $^{132}\text{Sn}$  beam for next-generation production of very neutron-rich nuclei," *Phys. Rev. C* **102**, 064615 (2020).
- Z. H. Yang, Y. Kubota, A. Corsi, K. Yoshida, X. -X. Sun, J. G. Li, M. Kimura, N. Michel, K. Ogata, C. X. Yuan, Q. Yuan, G. Authelet, H. Baba, C. Caesar, D. Calvet, A. Delbart, M. Dozono, J. Feng, F. Flavigny, J. -M. Gheller, J. Gibelin, A. Giganon, A. Gillibert, K. Hasegawa, T. Isobe, Y. Kanaya, S. Kawakami, D. Kim, Y. Kiyokawa, M. Kobayashi, N. Kobayashi, T. Kobayashi, Y. Kondo, Z. Korkulu, S. Koyama, V. Lapoux, Y. Maeda, F. M. Marqués, T. Motobayashi, T. Miyazaki, T. Nakamura, N. Nakatsuka, Y. Nishio, A. Obertelli, A. Ohkura, N. A. Orr, S. Ota, H. Otsu, T. Ozaki, V. Panin, S. Paschalis, E. C. Pollacco, S. Reichert, J. -Y. Roussé, A. T. Saito, S. Sakaguchi, M. Sako, C. Santamaria, M. Sasano, H. Sato, M. Shikata, Y. Shimizu, Y. Shindo, L. Stuhl, T. Sumikama, Y. L. Sun, M. Tabata, Y. Togano, J. Tsubota, F. R. Xu, J. Yasuda, K. Yoneda, J. Zenihiro, S. -G. Zhou, W. Zuo, and T. Uesaka, "Quasifree neutron knockout reaction reveals a small s-orbital component in the Borromean nucleus  $^{17}\text{B}$ ," *Phys. Rev. Lett.* **126**, 082501 (2021).
- T. Ikeda, "Applications of microbeams produced by tapered glass capillary optics," *Quantum Beam Sci.* **4**(2), 22 (2020).
- S. Kawamura, T. Ikeda, and W. -G. Jin, "Transmission characteristic of ultraviolet-laser microbeam with tapered glass capillary optics," *J. Phys. Soc. Jpn.* **89**, 055002 (2020).

## Presentations

### [Domestic Conferences/Workshops]

- 高橋弘幸, 西村太樹, 菅原奏来, 延與紫世, 福田直樹, 原田知也, 土方佑斗, 松村理久, 佐藤広海, 清水陽平, 鈴木宏, 竹田浩之, 田中純貴, 上坂友洋, 宇根千晶, 吉田光一, 錢廣十三 (口頭発表), 「Th ビームの開発に向けたイオンチェンバーの性能評価」, 日本物理学会第76回年次大会, オンライン, 2021年3月12-15日.
- 土方佑斗, 錢廣十三, 上坂友洋, 延與紫世, 大田晋輔, 坂口治隆, 佐藤広海, 清水陽平, 菅原奏来, 鈴木宏, 高橋弘幸, 武重祥子, 竹田浩之, 田中純貴, 辻峻太郎, 寺嶋知, 堂園昌伯, 西村俊二, 西村太樹, 馬場秀忠, 原田知也, G, 福田直樹, 松田洋平, 道正新一郎, 山村周, 吉田光一 (口頭発表), 「大強度かつ極めて重い不安定核ビームの粒子識別に向けたXeガスシンチレータの開発」, 日本物理学会第76回年次大会, オンライン, 2021年3月12-15日.
- 吉留勇起, 近藤洋介, 中村隆司, Nadia Lynda Achouri, Thomas Aumann, 馬場秀忠, Franck Delaunay, Pieter Doornenbal, 福田直樹, Julien Gibelin, Jongwon Hwang, 稲辺尚人, 磯部忠昭, 亀田大輔, 簡野大輝, Sunji Kim, 小林信之, 小林俊雄, 久保敏幸, Sylvain Leblond, Jenny Lee, Miguel Marques, 本林透, 村井大地, 村上哲也, 武藤琴美, 中嶋丈嘉, 中塚徳継, Alahari Navin, 西征爾郎, Nigel Andrew Orr, 大津秀暁, 佐藤広海, 佐藤義輝, 清水陽平, 鈴木宏, 高橋賢人, 竹田浩之, 榎野泰宏, Adam Garry Tuff, Marine Vandebrouck, 米田健一郎 (口頭発表), 「 $^{25}\text{O}$ の不変質量核分光」, 日本物理学会第76回年次大会, オンライン, 2021年3月12-15日.
- 池田時浩 (口頭発表), 「Applications of MeV-ion microbeams produced by tapered glass capillary optics」, 第21回「イオンビームによる表面・界面の解析と改質」特別研究会, 京都大学宇治キャンパス&オンライン, 京都, 2020年12月4-5日.
- 引間有花, 池田時浩, 森光正, 金衛国 (招待講演), 「生物照射のためのガラスキャピラリーマイクロビーム法とスポット径解析」, 原子衝突学会第45回年会, オンライン, 2020年12月8-10日.
- 引間有花, 池田時浩, 森光正, 金衛国 (ポスター), 「生物照射のためのガラスキャピラリーマイクロビーム法とスポット径解析」, 原子衝突学会第45回年会, オンライン, 2020年12月8-10日.
- 引間有花, 池田時浩, 森光正, 金衛国 (口頭発表), 「ガラスキャピラリーによるH $^{+}$ マイクロビームの大気中微小標的への照射距離の評価」, 第63回放射線化学討論会, オンライン, 2020年12月12-14日.
- 三宮圭人, 池田時浩, 森光正, 引間有花, 田山優雅, 福田彩実, 山口航平, 金衛国 (口頭発表), 「ガラスキャピラリーにおけるパルスレーザーマイクロビームの透過特性」, 第63回放射線化学討論会, オンライン, 2020年12月12-14日.

## Awards

- 引間有花, 「生物照射のためのガラスキャピラリーマイクロビーム法とスポット径解析」, 原子衝突学会第45回年会ホットトピック公演.