

Research Facility Development Division

Research Instruments Group

Detector Team

1. Abstract

This team is in charge of 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 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

Senior Research Scientist

Tokihiro IKEDA

Contract Researchers

Shinji MOTOMURA

Mizuki NISHIMURA

Visiting Scientists

Takeshi KOIKE (Tohoku Univ.)

Takuya SHIRAISHI (Kanagawa Univ.)

Student Trainees

Yurika DOWDY (Toho Univ.)

Harukichi MIYAZAKI (Toho Univ.)

Kotoko INAYOSHI (Toho Univ.)

Kana SAEKI (Toho Univ.)

Masataka MIYAMOTO (Toho Univ.)

Hirofuka SUZUKI (Toho Univ.)

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).
- B. Monteagudo, F. M. Marqués, J. Gibelin, N. A. Orr, A. Corsi, Y. Kubota, J. Casal, J. Gómez-Camacho, G. Authélet, H. Baba, C. Caesar, D. Calvet, A. Delbart, M. Dozono, J. Feng, F. Flavigny, J.-M. Gheller, 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, T. Motobayashi, T. Miyazaki, T. Nakamura, N. Nakatsuka, Y. Nishio, A. Obertelli, A. Ohkura, S. Ota, H. Otsu, T. Ozaki, V. Panin, S. Paschalis, E. C. Pollacco, S. Reichert, J.-Y. Rousse, 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, T. Uesaka, Z. H. Yang, J. Yasuda, K. Yoneda, and J. Zenihiro, "Mass, spectroscopy, and two-neutron decay of ^{16}Be ," *Phys. Rev. Lett.* **132**, 082501 (2024).
- Y. Kondo, N. L. Achouri, H. Al Falou, L. Atar, T. Aumann, H. Baba, K. Boretzky, C. Caesar, D. Calvet, H. Chae, N. Chiga, A. Corsi, F. Delaunay, A. Delbart, Q. Deshayes, Zs. Dombrádi, C. A. Douma, A. Ekström, Z. Elekes, C. Forssén, I. Gašparić, J.-M. Gheller, J. Gibelin, A. Gillibert, G. Hagen, M. N. Harakeh, A. Hirayama, C. R. Hoffman, M. Holl, A. Horvat, Á. Horváth, J. W. Hwang, T. Isobe, W. G. Jiang, J. Kahlbow, N. Kalantar-Nayestanaki, S. Kawase, S. Kim, K. Kisamori, T. Kobayashi, D. Körper, S. Koyama, I. Kuti, V. Lapoux, S. Lindberg, F. M. Marqués, S. Masuoka, J. Mayer, K. Miki, T. Murakami, M. Najafi, T. Nakamura, K. Nakano, N. Nakatsuka, T. Nilsson, A. Obertelli, K. Ogata, F. de Oliveira Santos, N. A. Orr, H. Otsu, T. Otsuka, T. Ozaki, V. Panin, T. Papenbrock, S. Paschalis, A. Revel, D. Rossi, A. T. Saito, T. Y. Saito, M. Sasano, H. Sato, Y. Satou, H. Scheit, F. Schindler, P. Schrock, M. Shikata, N. Shimizu, Y. Shimizu, H. Simon, D. Sohler, O. Sorlin, L. Stuhl, Z. H. Sun, S. Takeuchi, M. Tanaka, M. Thoennessen, H. Törnqvist, Y. Togano, T. Tomai, J. Tscheuschner, J. Tsubota, N. Tsunoda, T. Uesaka, Y. Utsuno, I. Vernon, H. Wang, Z. Yang, M. Yasuda, K. Yoneda, and S. Yoshida, "First observation of ^{28}O ," *Nature (London)* **620**, 965 (2023).

- Z. Elekes, V. Panin, T. R. Rodríguez, K. Sieja, D. S. Ahnh, A. Al-Adili, H. Baba, A. I. Stefanescu, K. J. Cook, Cs. Dósa, N. Fukuda, J. Gao, J. Gibelin, K. I. Hahn, Z. Halász, S. W. Huang, T. Isobe, M. M. Juhász, D. Kim, T. Kobayashi, Y. Kondo, Z. Korkulu, A. Kurihara, I. Kuti, H. Miki, K. Miki, T. Motobayashi, H. Otsu, A. Saastamoinen, M. Sasano, H. Sato, T. Shimada, Y. Shimizu, L. G. Sobotka, I. Stefanescu, L. Stuhl, H. Suzuki, H. Takeda, Y. Togano, T. Tomai, L. Trache, D. Tudor, T. Uesaka, Y. Utsuki, H. Wang, A. Yasuda, K. Yoneda, and Y. Yoshitome, “Shape coexistence in ^{66}Se ,” *Phys. Lett. B* **844**, 138072 (2023).
- H. Wang, M. Yasuda, Y. Kondo, T. Nakamura, J. A. Tostevin, K. Ogata, T. Otsuka, A. Poves, N. Shimizu, K. Yoshida, 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, Zs. Dombrádi, C. Douma, Z. Elekes, P. Fallon, I. Gašparić, J.-M. Gheller, J. Gibelin, A. Gillibert, M. N. Harakeh, A. Hirayama, C. R. Hoffman, M. Holl, A. Horvat, Á. Horváth, J. W. Hwang, T. Isobe, J. Kahlbow, N. Kalantar-Nayestanaki, S. Kawase, S. Kim, K. Kisamori, T. Kobayashi, D. Körper, S. Koyama, I. Kuti, V. Lapoux, S. Lindberg, F. M. Marqués, S. Masuoka, J. Mayer, K. Miki, T. Murakami, M. A. Najafi, K. Nakano, N. Nakatsuka, T. Nilsson, A. Obertelli, N. A. Orr, H. Otsu, T. Ozaki, V. Panin, S. Paschalis, A. Revel, 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. Sohrler, O. Sorlin, L. Stuhl, S. Takeuchi, M. Tanaka, M. Thoennessen, H. Törnqvist, Y. Togano, T. Tomai, J. Tscheuschner, J. Tsubota, T. Uesaka, Z. Yang, and K. Yoneda, “Intruder configurations in ^{29}Ne at the transition into the island of inversion: Detailed structure study of ^{28}Ne ,” *Phys. Lett. B* **843**, 138038 (2023).
- Y. Hijikata, J. Zenihiro, H. Baba, M. Dozono, S. Enyo, N. Fukuda, T. Harada, Y. Matsuda, S. Michimasa, D. Nishimura, S. Nishimura, S. Ota, Y. Shimizu, H. Sakaguchi, H. Sato, S. Sugawara, H. Suzuki, H. Takahashi, H. Takeda, S. Takeshige, J. Tanaka, S. Terashima, R. Tsuji, T. Uesaka, and K. Yoshida, “Development of a gaseous Xe scintillator for particle identification of high-intensity and heavy ion beams,” *Nucl. Instrum. Methods Phys. Res. B* **541**, 333 (2023).
- 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. Marqués, 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).
- A. Corsi, Y. Kubota, J. Casal, M. Gómez-Ramos, A. M. Moro, 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. Rousse, 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, T. Uesaka, Z. H. Yang, J. Yasuda, and K. Yoneda, “Searching for universality of dineutron correlation at the surface of Borromean nuclei,” *Phys. Lett. B* **840**, 137875 (2023).
- S. Go, Y. Tsuzuki, H. Yoneda, Y. Ichikawa, T. Ikeda, N. Imai, K. Imamura, M. Niikura, D. Nishimura, R. Mizuno, S. Takeda, H. Ueno, S. Watanabe, T. Y. Saito, S. Shimoura, S. Sugawara, A. Takamine, and T. Takahashi, “Demonstration of nuclear gamma-ray polarimetry based on a multi-layer CdTe Compton camera,” *Sci. Rep.* **14**, 2573 (2024).
- R. Mizuno, M. Niikura, T. Ikeda, T. Matsuzaki, S. Go, T. Y. Saito, S. Michimasa, and H. Sakurai, “Response of germanium detectors for high-energy γ -rays by $^{27}\text{Al}(p, \gamma)^{28}\text{Si}$ at $E_p = 992$ keV,” *Prog. Theor. Exp. Phys.* **2023**, 053H01 (2023).
- 阿部知子, 林依子, 森田竜平, 池田時浩, 高城啓一, 畑下昌範, 「ゲノム解析を用いたイオンビーム育種技術の高度化」, *JATAFF ジャーナル* **11**, 25 (2023).
- 赤松剛, 田島英朗, 田久創大, 山口充孝, 河地有木, 酒井真理, 黒澤俊介, 島添健次, 古川純, 本村信治, 錦戸文彦, 吉田英治, 高橋美和子, 山谷泰賀, 「医用コンプトンカメラの性能評価技術開発」, *Med. Imag. Tech.* **41**, 117 (2023).

Presentations

[International Conferences/Workshops]

- M. Kurata-Nishimura (invited), T. Isobe, T. Murakami, A. Ono, N. Ikeno, C. Y. Tsang, M. B. Tsang, W. G. Lynch, H. Otsu, and H. Sakurai, “Directed and elliptic flow using neutron rich Sn + Sn collisions with 270 MeV/nucleon,” 6th Joint Meeting of the APS Division of Nuclear Physics and the Physical Society of Japan, Hawaii, USA, November 26–December 1, 2023.
- M. Kurata-Nishimura (oral), T. Isobe, T. Murakami, A. Ono, N. Ikeno, C. Y. Tsang, M. B. Tsang, W. G. Lynch, H. Otsu, and H. Sakurai, “Collision dynamics using neutron rich and deficient Sn + Sn collisions with 270 MeV/nucleon,” 6th Joint Meeting of the APS Division of Nuclear Physics and the Physical Society of Japan, Hawaii, USA, November 26–December 1, 2023.
- C. Fukushima (oral), R. Matsumura, D. Nishimura, H. Otsu, H. Wang, H. Baba, N. Fukuda, T. Isobe, K. Kokubun, M. Kurata-Nishimura, S. Meigo, T. Nishi, H. Sakurai, M. Sasano, H. Sato, Y. Shimizu, T. Sumikama, H. Suzuki, H. Takahashi, H. Takeda, J. Tanaka, Y. Togano, K. Yoshida, and M. Yoshimoto, “Production of Np isotopes from ^{238}U beam at BigRIPS,” 6th Joint Meeting of the APS Division of Nuclear Physics and the Physical Society of Japan, Hawaii, USA, November 26–December 1, 2023.
- M. Kurata-Nishimura (invited), T. Isobe, T. Murakami, A. Ono, N. Ikeno, C. Y. Tsang, W. G. Lynch, and B. Tsang, πRIT collaboration, “Directed and elliptic flow observations in Sn + Sn collisions with radioactive beams at 270 MeV/nucleon,” NuSym23, XIth International Symposium on Nuclear Symmetry Energy, Darmstadt (GSI), Germany, September 18–22, 2023.
- M. Kurata-Nishimura (oral), “Directed and elliptic flow observations in Sn + Sn collisions with radioactive beams at 270 MeV/nucleon,” Equation of State of Dense Nuclear Matter at RIBF and FRIB, Wako (RIKEN), Japan, May 23–26, 2023.

[Domestic Conferences/Workshops]

池田時浩 (口頭発表), 白石卓也, 宮崎晴吉, 中竜大, 佐伯加奈, ダウディ 由莉香, 鈴木大貴, 稲吉琴子, 金衛国, 「ガラスキャピラリー

から出射されたイオンの超微粒子原子核乾板によるバックトレース」, 日本物理学会 2024 年春季大会, オンライン, 2024 年 3 月 18–21 日.

伊藤尚輝 (口頭発表), 外山裕一, 東俊行, 池田時浩, 長澤俊作, 岡田信二, 高橋忠幸, 高峰愛子, 上野秀樹, 「ペレトロン加速器からの陽子線マイクロビームを使った TimePix3 読み出しチップ搭載型 Si ピクセル検出器の陽子イオン検出性能の評価」, 日本物理学会 2024 年春季大会, オンライン, 2024 年 3 月 18–21 日.

西村美月 (口頭発表), 「WA98 実験からの FLOW の先へ」, 三好康郎先生退職記念祝賀会及び最終講義・研究会, つくば市 (筑波大学), 2023 年 12 月 9 日.

宮崎晴吉 (口頭発表), 白石卓也, 池田時浩, 中竜大, 佐伯加奈, Y. C. Dowdy, 鈴木大貴, 小林知洋, 稲吉琴子, 金衛国, 「ガラスキャピラリーを用いたイオンマイクロビームの超微粒子原子核乾板によるビームプロファイルの精密測定」, 第 84 回応用物理学会秋季学術講演会, 熊本市, 2023 年 9 月 19–23 日.

池田時浩 (口頭発表), 白石卓也, 宮崎晴吉, 中竜大, 佐伯加奈, ダウディ由莉香, 鈴木大貴, 小林知洋, 稲吉琴子, 金衛国, 「ガラスキャピラリーからのイオンマイクロビームプロファイルの超微粒子原子核乾板による 3 次元精密測定」, 日本物理学会第 78 回年次大会, 仙台市 (東北大学), 2023 年 9 月 16–19 日.