

PREFACE

The RIKEN Accelerator Progress Report is the annual publication detailing all research activities conducted at the RIKEN Nishina Center for Accelerator-Based Science (RNC). This volume (No. 58) covers work carried out during the Japanese fiscal year 2024 (April 2024 to March 2025).

Last year was a tumultuous one for Japan. A major earthquake, followed by the heavy rains, struck the Noto Peninsula where many residents continue to face challenging. In contrast, Japanese athletes delivered outstanding performances at the Paris Olympics and Paralympics, bringing moments of pride and unity. Politically, the “slush fund scandal” eroded public trust, while the growing influence of social media and the other digital forms continued to traditional media. These developments highlight a broader social shift, from an era dominated by organizations to one shaped by individuals. Today, people share information through their own specialized perspectives and becoming more selective and discriminating in how they consume and evaluate information.

For RIKEN, 2024 marked the final year of the 4th Mid- to Long-Term target period. During 2023-2024, RIKEN engaged in planning for the upcoming 5th Term, which begins in 2025. In 2023, both the Nishina Center Advisory Committee and the RIKEN Advisory Committee were organized, where “The RI Beam Factory Upgrade Plan” received high praise. Based on this Plan, the first international workshop “ADRI B” dedicated to the upgrade was held in January 2024. The second workshop, ADRI B25, was organized in January 2025, in conjunction with the RIBF User Meeting.

In the field of nuclear physics, a project jointly proposed with the Institute for Basic Science (IBS) in Korea was selected as a top-tier project by the National Research Foundation of Korea. This recognition is expected to significantly promote Japan-Korea joint research over the next decade. Additionally, Hiroki Okuno launched a new project under the Moonshot Research and Development Program of the Japan Science and Technology Agency. He was appointed as a Program Manager for Moonshot Goal 10, “Fusion Energy”, and is committed to developing high-intensity neutron sources and advanced fusion system through innovative acceleration technology.

Three new laboratories and research groups were established; the Meson RIKEN ECL Research Team, led by Tadashi Hashimoto on April 1st 2024; the Three-Body Nuclear Force (3NF) Laboratory, led by Kimiko Sekiguchi on September 1st 2024; and the Multi-Scale Quantum Dynamics (MSQD) Joint Research Group, led by Tomohiro Uesaka on January 1st 2025. The Meson Team focuses on the study of meson in nuclei and exotic atoms. The 3NF Laboratory serves as a key base in RNC for advancing the ERATO Sekiguchi 3NF Project. The MSQD Group aims to develop interdisciplinary programs through coherent collaborations across three major domains of nuclear physics: low-, intermediate- and high-energy nuclear physics.

In 2024, RNC achieved numerous outstanding research results. Seven press releases were issued to share key findings with the public. A selection of notable accomplishments is presented in the Highlights of the Year section of this volume, showcasing RNC’s successful multi-disciplinary contributions to science, technology, and innovation. One of the highlights is the discovery of fluorine-30, offering the new insights into interplay between magicity and superfluidity around oxygen-28. Another major achievement is a significant step toward realizing ‘nuclear clock’ marked by the lifetime of Thorium-229’s ultra-low-energy nuclear excited state.

In 2024, many members of the RNC were recognized with prestigious awards for their outstanding achievements. Susumu Shimoura received the Nishina Memorial Prize from the Nishina Memorial Foundation. Kimiko Sekiguchi was awarded the Science and Technology Award (Research category) by the Minister of Education, Culture, Sports, Science and Technology. Makiko Nio and Masashi Hayakawa received the 24th Particle Physics Medal from the Physical Society of Japan. Tatehiro Mihara received the Group Achievement Award from NASA and the ISS Research Award at the ISS



R&D conference. Tadashi Hashimoto and Shinya Yamada were awarded the Koshiba Prize from the Foundation for High Energy Accelerator Science. Yusuke Kazama, Tomoko Abe, Kotaro Ishii and Shigeyuki Kawano received the Hirose Prize from the Japanese Society of Plant Morphology. Rurie Mizuno was honored with the Research Encouragement Award from School of Science, The University of Tokyo. Tomoki Murakami, Yuto Hijikata and Cheng-Wei Shih received the Student Presentation Award from the Physical Society of Japan. Cheng-Wei Shih also received the Poster Presentation Award at the 12th International Conference on Hard and Electromagnetic Probes of High-Energy Nuclear Collisions. Yoshitaka Hatta was awarded the Science & Technology Award from Brookhaven National Laboratory. Additionally, the 2024 RIKEN Awards, the "EIHO Award," "BAIHO Award," and "OHBU Award" were presented to nine members in RNC, as listed in the "RIKEN Awards" section of this volume.



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