

PREFACE



The RIKEN Accelerator Progress Report is the annual report of all the research activities conducted at the RIKEN Nishina Center for Accelerator-Based Science (RNC). This volume, No. 54, covers the activities conducted during the Japanese fiscal year of 2020 (i.e., April 2020 to March 2021).

Last December, the news of the sad demise of Prof. Dr. Akito Arima, who passed away on December 6, 2020, became widespread worldwide. As many people know, he was a distinguished physicist of the nuclear structure theory. As one of the top administrators of universities and institutes, he contributed toward the promotion of academic activities in the field of science and technology; he was also a politician

of the House of Councilors and ministers of the government. He was the President of RIKEN from 1993 to 1998; during this period, he launched three major research activities at the current RNC: realizing the RI Beam Factory (RIBF) project, and establishing the RAL branch office for muon sciences and the RIKEN BNL Research Center (RBRC) for high-energy nuclear physics. Following the commencement of its operation in 2007, the RIBF has become one of the best facilities worldwide for low-energy nuclear physics. I was incredibly happy to present him with the achievements of the RIBF at the conference in Shanghai in 2018, as a celebration of his 88th birthday. Furthermore, he also encouraged international relationships with Asian countries, especially China and Vietnam, and significantly improved research collaboration. At the RNC Monthly Meeting held on December 9, 2020, all the RNC members offered a silent prayer in view of his considerable achievements and contributions. As a person, he was known for his firm philosophy and humanity; he loved nature, physics, and the youth. At this occasion, I would like to offer my deepest condolences and also express my sincere respect for his guidance across a wide range of fields.

In 2020, the world was affected by the COVID-19 pandemic. Consequently, given that the coronavirus is carried and spread by people, people's activities have been severely restricted. Nevertheless, personal relationships remained intact owing to advances in the Internet. As a result, many discoveries pertaining to human communication through various online/virtual activities have been reported. For instance, all the PAC meetings in FY2020 were organized remotely. Furthermore, certain symposia and workshops were conducted in a hybrid style combining in-person and online communications.

Onsite activities, where people and things/facilities interact, form the essence of technological development and experimental research. It is, therefore, considerably important to implement measures for preventing the spread of the coronavirus. At the RIBF, we were able to avoid a divide between people and things/facilities, while sustaining the research activities. Local and domestic staff members realized achievements in terms of developing facilities and conducting experiments. One such achievement is the upgrade of the RILAC (SRILAC) and the complete installation of GARIS-III; this represents the completion of the preparation for moving forward with novel research. Furthermore, we succeeded in increasing the ^{70}Zn and ^{238}U beam intensities at the SRC, thus realizing a high-intensity beam for the HiCARI campaign using "tracking" germanium detectors and the mass measurement of many unknown nuclei during the MR-TOF experiment performed in parallel.

However, onsite research activities were still stagnant, given the restrictions on people traveling across borders and overseas. This resulted in a divide between people and things/facilities at the overseas research facilities of the RHIC and RAL and the joint international research at the RIBF.

Seventeen press releases were issued in FY2020, and selected achievements of 2020 are compiled in the "Highlights of the Year" section of this volume. These indicate the growing multi-disciplinary activities at the RNC for science, technology, and innovation. It should be noted that these achievements were made not only by in-

house researchers and engineers at the RNC but also by collaborating users at the RIBF, RBRC, and RAL. The paper titled “Surface localization of the dineutron in ^{11}Li ,” which was published in Physical Review Letters, is a result of the first spectroscopy with fully completed kinematics measurements conducted at SAMURAI in order to demonstrate the dineutron component in ^{11}Li . With regard to heavy-ion beam breeding, the paper titled “Improvement of rotifer as the new food item in larviculture” had a significant impact on the society, and the results were featured as “Godzilla the rotifer” in the Economist magazine issued January 23, 2021.

Awards were also presented to the colleagues of the RNC. Takahiro Nishi was presented with the 17th Annual Meeting Award of the Particle Accelerator Society of Japan, and Takashi Ichihara was presented with the 2020 JPCERT/CC Certificate of Gratitude, JPCERT Coordination Center. Furthermore, the Nishina Memorial Prize was awarded to Kazuma Nakazawa, a visiting scientist at the Strangeness Nuclear Physics Laboratory.

With regard to the organization of the RNC, Hiroyuki Ichida and Masanori Kidera were appointed as the Team Leaders of the Plant Genome Evolution Research Team and the Infrastructure Management Team, respectively, as of October 2020.

The coronavirus crisis is expected to continue even after 2021. Nevertheless, we are extremely grateful to be blessed with an environment that allows us to continue with our research. Hence, it is vital that we acknowledge the mission of RIKEN and aggressively accept new challenges in research and development activities.



Hiroyoshi Sakurai

Director

RIKEN Nishina Center for Accelerator-Based Science