Preface

The fiscal year 2024 marked a truly historic milestone for SPring-8: the long-awaited approval of the SPring-8-II project, which will transform our facility into a fourth-generation synchrotron radiation source. This achievement would not have been possible without the steadfast support and tireless efforts of our community. With deep gratitude, we now set our sights firmly on completing construction in FY2028 and commencing shared user operations in FY2029.

The SPring-8-II upgrade entails a complete replacement of the storage ring, yielding a source approximately one hundred times brighter than the present facility, while halving the electricity consumption required for accelerator operations. According to the current schedule, shutdown will begin in the summer of 2027, followed by the replacement of the storage ring, commissioning from late autumn 2028, and the resumption of user operation in FY2029.

The year also witnessed important developments beyond Harima. At the start of 2024, trial user operations commenced at the new NanoTerasu facility in Sendai. Many SPring-8 staff members who had been seconded to support the accelerator construction there returned to Harima, while operations at NanoTerasu were entrusted to QST's accelerator team. Remarkably, the facility started at a stored beam current of 200 mA—well above initial expectations—and tuning toward the design current of 400 mA is underway. In parallel, the related law was revised to formally recognize NanoTerasu as a QST-operated shared-use facility. The associated Diet deliberations brought renewed attention to the aging of SPring-8, and strong parliamentary calls for modernization ultimately catalyzed national commitment to the SPring-8-II upgrade.

During the August budget request process, the project was proposed as a four-year commitment starting in FY2025, with a total budget of approximately 50 billion yen. However, the schedule was advanced: in the autumn supplementary budget of FY2024, funding was secured, and with the passage of the budget in December, the SPring-8-II project was officially launched.

The accelerator replacement requires a carefully orchestrated process: components will be assembled and precisely aligned on-site, then transported into the storage ring tunnel for installation and final adjustment. The former klystron gallery of the injector has been repurposed as a staging and alignment hall for this work. Contracting for accelerator components has progressed smoothly, with more than 90% expected to be concluded in the first half of FY2025.

This efficiency has been enabled by the fact that most components were validated at NanoTerasu, with only a fraction of new development being required, mainly for the injection system.

Alongside these technical preparations, issues of user engagement and visibility have come to the fore. Despite strong recognition within academia and industry, broader public awareness of synchrotron radiation remains limited. Enhancing outreach and communication will therefore be a key priority.

Since its launch in 1997, SPring-8 has both advanced synchrotron science and reshaped the role of photon science in society. These transformations will be amplified by SPring-8-II. Discussions surrounding the upgrade have highlighted the growing importance of top-down, mission-driven programs in addition to the traditional bottom-up model of academic and industrial use. Accordingly, new initiatives have begun in areas such as social infrastructure diagnostics, advanced semiconductor evaluation, and applications in agriculture, forestry, and fisheries. A new medium-length experimental hall is also under construction adjacent to the existing Medical Imaging Building, initially to serve as an assembly area for accelerator components, and later to house future beamlines.

The transition to SPring-8-II will necessarily involve a shutdown of more than one year, presenting significant challenges for user support. To mitigate the impact, we are collaborating with domestic facilities, including NanoTerasu, and seeking cooperation from international partners. In close coordination with JASRI, we will provide timely updates and ensure that the user community remains supported throughout this period.

The SPring-8-II project stands as both a renewal and a transformation—one that will not only sustain but also elevate Japan’s leadership in synchrotron radiation science. With continued partnership and commitment, we look forward to creating the next chapter of innovation and discovery together.

ISHIKAWA Tetsuya, Dr. Eng.
Director, RIKEN SPring-8 Center