

PREFACE

On behalf of the staff of the Photon Factory (PF), I am pleased to present PF Highlights 2024. We hope that many readers will explore the PF Highlights to learn about the latest topics in synchrotron radiation science from the PF, including in slow positron science. I hope that this latest issue of PF Highlights will lead to new discoveries in scientific studies.

The mission and role of PF is to pioneer and advance the frontiers of diverse academic research related to material and life science, in collaboration with university researchers. To achieve this, we believe diversity and flexibility are essential across various aspects, including beamline facilities, beamtime operations, facility management, human resource development, and technological development. Therefore, PF is steadily advancing the operation of existing facilities and both short- and long-term future plans under the banner of “Diversity Frontier.”

In the previous issues, as a long-term future plan, we reported on the conceptual design of our new facility, the Photon Factory Hybrid Light Source (PF-HLS), which will enable a wide range of two-beam applications. Currently, as an advanced form of this technology, we are advancing studies on the “Quantum Multi-Beam Facility Project”, which enables the simultaneous use of not only synchrotron radiation but also other quantum beams such as neutron, muon, and positron. These quantum beams have been widely used for academic research via several collaboration programs at the Institute of Materials Structure Science (IMSS). The “Quantum Multi-Beam Facility Project” is expected to elucidate the fundamental nature of matter and life from multiple perspectives by simultaneously utilizing these quantum beams.

As a short-term plan, beam stabilization of the PF ring and reconstruction of BL-11 and BL-12 are under way. Regarding the beam stabilization of the PF ring, the power supplies of the magnets with high accuracy current control have been updated and now in operation. In addition, the high-speed orbit stabilization system is being upgraded through the installation of fast-steering power supplies and updates to the beam position monitors (BPM). BL-11 (-11A, -11B) is a beamline dedicated to R&D, enabling trial runs of innovative ideas in beamline sciences, including two-beam applications by simultaneous use of the two branch beamlines. BL-12A is a prototype beamline for wide wavelength applications with a diffraction grating and a double-crystal monochromator covering an energy range from 50 eV to 5000 eV. The construction of BL-11 was started in the spring of 2023 and will be completed in the fall of 2025 (background of the picture). The construction work of BL-12A was completed in the summer shutdown of 2024 and was opened for users in November of 2024 after beam commissioning. We look forward to seeing the many cutting-edge achievements that will emerge from these new concept beamlines soon.

We resumed the Indian Beamline Project at BL-18B in the fall of 2024. The Indian Beamline was initially established in 2009 after both the Indian and Japanese prime ministers welcomed it in a joint statement. The beamline has been actively used and the project has been a great success. The third phase of the project has been approved and the MOU has been extended for another five years (2024-2029). We look forward to further developments of this beamline project and strengthening of our collaborative relationship in the future.

Noriyuki Igarashi
Director of Photon Factory

