Introduction

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In its 25th year of operation, the Photon Factory has continued to serve the synchrotron radiation community by providing 4000 plus hours of beam time per year on the 2.5 GeV PF and the 6.5 GeV PF-AR rings. In this issue, we present research highlights from the Photon Factory, selected from more than 500 publications during the period by well over 3000 users. The budget situation still being harsh, we have proceeded with the action plan to strengthen further the activities at the two rings with about 60 experimental stations. The beam line refurbishment plan aims to strengthen the areas of excellence (AOE) by concentrating efforts on relevant fields, improving efficiency of the 2.5 GeV PF ring and the 6.5 GeV PF-AR ring. To accomplish these goals, we prepared an action plan to reorganize the beam lines. The driving principle is to exploit the insertion device beam lines to the full extent, and rearrange beam lines so that activities requiring low to medium energy synchrotron beams will be concentrated on the 2.5 GeV PF ring while those requiring medium to high energy X-rays will be brought together to the 6.5 GeV PF-AR ring. Immediate benefits are much higher efficiency in conducting user experiments on dedicated stations as compared to the time-sharing mode with mobile experimental apparatuses on the insertion device beam lines where undulator and multipole wiggler operations shared the same insertion device. As the net result of the action plan, we will decrease the number of stations by 9 by decommissioning 28 stations and building/relocating 19 stations. We made many efforts to proceed with the action plan, combining attempts to secure external funding in collaboration with many user groups. One prominent example is BL-16 at the PF ring for research on magnetic materials, surfaces and interfaces. The beam line will be equipped with two Apple-II type undulators with fast switching, 10 Hz or faster, of circular polarization for X-ray magnetic circular dichroism (XMCD) experiments in the soft X-ray region. It will enable very high detection level of XMCD measurements by a combination of the fast polarization switching and an intricate, yet robust, slit mechanism to make the two beams from the two undulators equivalent in intensity and energy.

The above mentioned AOE include six themes: (a) strongly-correlated electron systems, (b) materials under extreme conditions, (c) novel material device: polymer and functional organic materials, & nano materials, (d) environment, energy, and rare materials (high sensitivity chemical state analyses), (e) structural biology of molecular machinery, and (f) chemical reactions: from fundamentals to applications. These are the areas in which the PF wishes to concentrate its efforts to maximize scientific outputs. This is part of our three-pillar strategy: (1) Areas of Excellence, (2) Light Source and Beam Line Developments, and (3) Facility Operation. We consider that the latter two are critical components for the facility to serve the wider synchrotron radiation community. For example, the developments and preparation for top-up operation of the PF 2.5 GeV ring are at the top of the priority list of the Light Source Division activities in collaboration with the Electron-Positron Injector Division of the KEK Accelerator Laboratory. The program is proceeding well already with successful single bunch test operations, and is scheduled to commence user operation in the fall of 2009. As for the facility operation, we spent 12 months to prepare the establishment of a new group structure which started in April 2007. The new group structure includes groups concentrating on the latter two components of the three-pillar strategy as well as those for the next light source projects.

The PF is part of the Institute of Materials Structure Science (IMSS) which has two missions: (1) providing state of the art facilities for synchrotron, neutron, muon, slow positron experiments and (2) pursuing original research using these beams. To this end, two research centers were envisaged: structural biology and condensed matter physics. The Structural Biology Research Center (SBRC), which was established in 2003, continues to be active in both structural biology research, and beam line developments and operation. The center provided 30 % of beam time on the structural biology beam lines to Protein 3000 Project. At the same time, it pursued structural biology research on post-translational modification and vesicle transport as the leader of 21 research groups in the team. Altogether, the team solved 254 structures from 2003 to the end of the project in March 2007. Following Protein 3000 Project, Target Protein Research Program started in 2007 as a new five year project. The SBRC is again involved in the beam line development and structural biology research on vesicle transport. The beam line project is in collaboration with SPring-8, Hokkaido University, Osaka University, and Kyoto University, and aims

to develop two complimentary micro-beam beam lines, BL32XU at SPring-8 and BL-1 at PF along with relevant technologies for structural analyses of difficult targets.

As for condensed matter physics research, there have been intensive discussions on the establishment of a new research center, Condensed Matter Research Center. They culminated in the appointment of Prof. Youichi Murakami as Director. A number of new recruits have followed this towards expedient preparation of the new research center. The center will build on four pillars: (1) strongly correlated electron systems, (2) materials under extreme conditions, (3) soft condensed matter & biomolecules, and (4) surface, interface & catalysis, which encompass many fields chosen in the AOE. The center is expected to start in April 2009 with the aim to establish collaborations with other universities and research institutes to develop multidisciplinary research network taking advantage of the four probes, synchrotron radiation, neutron, muon, and slow positron beams.

Following the advice of the international external review committee in March 2006, Photon Factory International Science Advisory Committee (PF-ISAC) has been established. It meets on average every nine months or so interlaced with subcommittees in chosen areas. In fiscal year 2007, two subcommittees were organized on electronic structures and medical imaging. They are to be followed by other fields such as life sciences, condensed matter science, chemistry, machine, with the aim of having two subcommittees each year. In addition, Synchrotron Radiation Strategy Planning Working Group (SRSP-WG) has been formed with domestic leaders in the synchrotron radiation, structural materials sciences and life sciences. The two committees serve as forums to discuss the strategy, immediate and medium term action plans. The 10 members of the PF-ISAC are all world experts in synchrotron radiation and about half of them are overseas members. The selection of science fields as the AOE was first discussed internally followed by consultation with the IMSS Steering Committee, the SRSP-WG and the PF-ISAC, and dialogues with the PF User Organization. The discussions have provided us with incalculable advice which has helped us to pursue and refine the action plan.

Turning to a wider context, the KEK Roadmap was discussed at the end of FY2007, March 2008 by an international panel of leading scientists in the International Review Committee of the KEK Roadmap. While the KEK-B factory experiment was nearing to its goal, a strategic plan for the next 5 to 10 years was of absolute importance for KEK overall. In the review meeting, we have strongly advocated the importance of photon science on the KEK Tsukuba campus. Along this line, Photon Factory has been pushing for the construction of the compact ERL (cERL) to be completed by 2012. The cERL project has grown to a respectable size, now counting more than 100 people involved, and with the East Counter Hall designated as the construction site for the cERL. The Committee has made a very strong suggestion on the importance of a timely completion of the cERL in order to complete a conceptual design report of the 5 GeV class X-ray ERL machine to supersede the PF and PF-AR rings.

Communication with the PF user community is one of the most important aspects of the facility operation. In this regard, the PF User Organization and User Groups (UG) play pivotal roles. Through various channels, we continued our dialog with the PF User Organization on the action plan, details of the beam line refurbishment plan, and other new developments in the PF. For instance, a new scheme of meta User Groups have been established. Several related UGs have been grouped into five meta UGs for discussion on beam line decommissioning, merger, and construction of beam lines. This was considered necessary for efficient and wider discussion with users. The 25th Photon Factory Symposium, was held in March 2008, and attended by a record numbers of participants, 205, and posters, 136. The Director General, Prof. Atsuto Suzuki gave a talk on the KEK Roadmap, and emphasized the importance of science drivers and consensus of the community concerning the next light source at the KEK campus. The number of posters has increased significantly and a wide range of sciences were discussed during the symposium. It was preceded by a workshop on ERL whose summary was presented and discussed during the PF Symposium. Keeping in line with the concept of the annual joint meetings of the Japanese Society of Synchrotron Radiation Research, the PF Symposium will evolve into a research forum to discuss sciences and technology developments from the Photon Factory in the following years.

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