

# Introduction

---



Tadashi Matsushita

The most notable event for the Photon Factory in fiscal year 2001 (April 2001 – March 2002) was the 20th anniversary of the first observation of Synchrotron Radiation from the 2.5-GeV PF Storage Ring. We had a celebration ceremony in March 2002, and it was a good chance for us to look back to the past and think about the future. We have continued our efforts to keep the 20 year old facilities and research activities vital and vivid.

Complete replacement of the vacuum system of the single-bunch 6.5-GeV Ring was completed in December 2001 and the re-commissioning of the ring started in January 2002 after a 10-month shutdown. The lifetime of the electron beam has been improved to 10 hours from its old value of 2-3 hours. A new in-vacuum undulator beamline, NW-2, was constructed and commissioned. A liquid-nitrogen-cooled monochromator was successfully commissioned and a monochromatic X-ray beam was obtained with a focus size of 0.45 mm (H) × 0.15 mm (V) as described in more detail in the “Experimental Facilities” section of the present volume. Time resolved XAFS experiments will be carried out on this beamline.

In parallel to the ring vacuum upgrade, a new experimental hall building of 1280 m<sup>2</sup> was completed at the northwest corner of the 6.5-GeV Ring. A new insertion device beamline, NW-12, for protein crystal structure analysis is being prepared and will be constructed in the new experimental hall. The beamline will be installed there in the summer shutdown of 2002, and its commissioning will be done in the fall of 2002. Upon completion of this beamline, the number of beamlines equipped with insertion devices on the 6.5-GeV Ring will be four.

On the 2.5-GeV Ring, a new bending magnet

beamline, BL-1A, was successfully commissioned for the structural study of highly correlated electron systems. This beamline will be equipped with a collaborative system, which enables users to participate in their experiments even though they are in their home institutions, far from PF.

Beamline BL-9C was returned to PF from the NEC Company a few years ago and has been converted to a part-time simultaneous small- and wide-angle scattering experimental station. Operation of this station will be helpful in easing over-demanded beam time on the small angle scattering beamline, BL-10C.

Design of a new multi-pole wiggler beamline for protein crystal structure analysis, to be constructed on BL-5, has been almost completed. BL-5 will utilize the last straight section left of the present lattice of the 2.5-GeV Ring. Fabrication of the beamline components will be started in fiscal year 2002 and commissioning of the beamline is scheduled in October 2003.

In order to increase the number of insertion device beamlines for the 2.5-GeV Ring, we plan to modify the ring lattice and create 7 more straight sections as described in the “Accelerators” section of the present volume. Although the whole project has not been officially approved yet, some preparatory design has already been initiated: the front-ends of 3 beamlines are being reconstructed and a prototype of new quadrupole magnets was designed during fiscal year 2001. Continual efforts are being made to obtain full support for creating new straight sections for insertion devices.

Steady and stable operation of the Photon Factory facilities has been achieved. The total

---

operation time of the 2.5-GeV Ring and the 6.5-GeV Ring were 5,536 and 1,416 hours, respectively. More than 2,700 users visited the Photon Factory in fiscal year 2001.

The Photon Factory structural biology group, formed in April 2000, is expanding its activity and producing fruitful results. The sample preparation facility, built last year, is now fully utilized. Two insertion device beamlines (NW-12 on the 6.5-GeV Ring and BL-5 on the 2.5-GeV Ring) are being built or designed to strengthen the activities of this group. The group also started its activity as the core of a structural genomic consortium of Japanese universities.

We have had a number of interesting experimental results in diverse fields and areas. These results are reported in the "Highlights" section and also in PART-B of the present activity report.

The bending magnet beamlines of the 20 year old storage ring are still actively used for studies of structural, electronic and/or magnetic properties of novel samples such as  $\text{MgB}_2$ ,  $\text{NaV}_2\text{O}_5$ , carbon nanotubes,  $\text{La}_{2/3}\text{TiO}_3$ , MnAs quantum dots and molecule-adsorbed Co/Pd(111) film. Users having new and original sample materials will be offered further opportunities with more friendly interfaces and environments. New technical and methodological developments were also made as can be seen in the examples of soft X-ray energy dispersive surface XAFS, X-ray holographic imaging and micro X-ray imaging. Atomic physics is one of the traditionally

supported areas at the Photon Factory. Double photo-excitation of atoms in an external field and Stark quantum beat spectroscopy in Ne were extensively studied. High pressure science has also been one of active areas since an early stage of the facility. With continual effort to improve the pressure cell, important and valuable contributions to earth science are being made.

An external review of the Photon Factory was carried out in the latter half of fiscal year 2001 to review its activities since 1996. Besides a general review of the whole PF, the committee was requested to put special emphases on reviewing the performance and scientific activities of individual beamlines. The committee is now in the process of drawing up the final report. We hope that the review will provide advice on a program of beamline reconstruction for the near future, and help develop a strategy for the long term.

As part of new policy, the government has decided that KEK will be an independent administrative institution from April 2004. A preparatory committee for the transition of KEK to an independent administrative institution was initiated, and the present organization chart is likely to be partly modified. We hope to profit from this new situation, and request all users of PF to make known their opinion and advice regarding these important changes.



Tadashi Matsushita