High Energy Accelerator Research Organization (KEK)
Institute of Materials Structure Science (IMSS)
Photon Factory

Photon Factory SAC Meeting
October 6-7, 2011

Executive Summary and Closing Remarks

Ingolf Lindau, Committee Chairperson

October 7, 2011

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SAC Committee Members

6th SAC Meeting – October 6-7, 2011

Ernest Fontes (Cornell High Energy Synchrotron Source)*
Efim Gluskin (Advanced Photon Source)
Keith Hodgson (Stanford Synchrotron Radiation Lightsource)
Yasuhiro Iwasawa (The University of Electro-Communications)
Yasuhiro Iye (Institute for Solid State Physics, The University of Tokyo)
Ingolf Lindau (Stanford University) Chair
Kunio Miki (Kyoto University)
Junichiro Mizuki (Kwansei Gakuin University)
Fulvio Parmigiani (University of Trieste)
Moonhor Ree (Pohang Accelerator Laboratory/POSTECH)
Zhentang Zhao (Shanghai Synchrotron Radiation Facility)

*absent for October 6th & 7th, 2011 meeting

Discussion Point 1: How effective and efficient were the earthquake recovery and refurbishment processes, and the coordination with other SR facilities for experiments during recovery?

- SAC compliments the KEK and PF management and staff for the tremendous effort in the recovery to bring the laboratory back into operation after the disastrous earthquake March 11, 2011. The exceptional leadership of the KEK and PF with meticulous planning was clearly manifested in this crisis situation.
- The impact on the users was mitigated with a large number of proposed experiments scheduled at other Japanese SR facilities with admirable efforts by PF staff scientists to assist in these experiments.
- SR experiments were also scheduled at international facilities, not only reflecting the willingness of these facilities to help but also the high standing of PF in the international community.
- Considerable resources had to be allocated to the recovery, resources that otherwise were intended for upgrade of, for instance, SR instrumentation and support of scientific programs. SAC strongly supports any PF/KEK initiative that would bring in supplementary financial funding for the recovery.

Discussion Point 2: Relation between the PF operation and KEK-B – upgrade

- PF-AR is presently injected with 3 GeV electrons that are ramped to 6.5 GeV. The upgrade of SuperKEKB calls for a change to injection with 4 GeV positrons, which are then ramped to 6.5 GeV. This upgrade requires a shutdown of PF-AR that will seriously affect its scientific program.
- SAC strongly urges PF management that the upgrade is closely coordinated with the commissioning team of the SuperKEKB project so that the scientific programs on PF-AR are compromised to least possible extent.

Discussion Point 3: Is the second phase of the refurbishment plan aggressive enough?

- SAC overall commends the PF staff and management for continuing the beam line renewal process that was begun a few years ago and is an essential element in maintaining an internationally competitive facility until an ERL is in operation.
- Beam line decommissioning and renewal process has generally followed SAC's recommendations and is progressing as rapidly as can be reasonably expected given available funding, manpower and dynamics of dealing with a large, in some cases somewhat entrenched, user community.
- SAC realizes that there are still too many BLs to be supported by the available scientific staff (which is generally constrained in size) and that many scientists have to support more than one beam line. This remains very non-optimal. One way of mitigating this situation is to continue the process of the consolidation of beam lines.
- SAC strongly encourages PF management to continue to ask hard questions about beam line productivity, also having a view toward future activities in the context of the planned ERL. Decommissioning of low productive beam lines on an accelerated schedule is strongly supported.

Discussion Point 4: How does PF-SAC evaluate the results and suggestions of the two subcommittees: condensed matter and materials & chemistry?

- SAC reviewed the two Subcommittee Reports on Condensed Matter and Materials & Chemistry and very much appreciated the clear and extensive presentations by Prof. J. Mizuki and Prof. Y. Iwasawa and thoughtful responses by PF representatives.
- SAC fully supports the observations, conclusions and recommendations of the two Subcommittees.

Discussion Point 5: Is the plan for the transition from the PF-Kondankai to a more independent and full-membership PF User Association sound and timely?

- SAC welcomed the proposal for a major change of the users' organization and fully supports a more independent user association with broad membership of all PF users.
- SAC commends PF management for this change that will make PF user organization more in-line with similar organizations at many international facilities and other domestic facilities.
- SAC looks forward to the implementation of the new model.

Discussion Point 6: Are we moving in the right direction and fast enough towards the realization of ERL? Is the change of energy from 5 GeV to 3 GeV reasonable?

- SAC strongly endorses the KEK strategy to design, build and operate an ERL as a future next generation light source serving a broad scientific community.
- SAC was very impressed by the great progress on the cERL project and the advances in the development of the Conceptual Design Report for the 3 GeV ERL.
- SAC commends the ERL team for its leadership and participation in both national and international workshops to promote the scientific case and to address technical challenges of an ERL as a future photon source at KEK.
- SAC also strongly endorses the presented PF roadmap for the project with the completion of the cERL by the end of FY 2012 and start of the construction of the 3 GeV ERL around 2015.
- SAC fully appreciates the rationale behind the decision to change the energy from 5 GeV to 3 GeV since it has the following benefits: lower construction and operating costs, mitigation of technical challenges, speeding up the construction, and minimal impact on the strength of the scientific case.

Discussion Point 6: Are we moving in the right direction and fast enough towards the realization of ERL? Is the change of energy from 5 GeV to 3 GeV reasonable? (continued)

- SAC notes that the 3 GeV ERL will provide the Japanese VUV-SXR community with extremely high brilliance soft x-ray beams. The source characteristics are superior to existing Japanese soft x-ray SR sources and will provide Japan with a world-class facility.
- In accepting and fully endorsing the reduction of the ERL energy from 5 to 3 GeV, SAC notes that such a reduction obviously affects the high-energy end of the x-ray spectrum. Therefore SAC strongly recommends to consider all possible approaches to mitigate this reduction. In particular, SAC suggests to incorporate in the design of 3 GeV ERL the most advanced insertion devices, such as superconducting planar and helical IDs, as well as cryo-cooled in-vacuum IDs. For the single pass machine, such as the ERL, the optimal combination of different types of novel IDs will guarantee unique polarization properties and record high brightness for x-rays well above 10 keV.
- SAC also notes that 3 GeV ERL energy could impact the undulator design of the XFEL-O. The potential solution also directs toward utilization of novel superconducting small period undulators.

Discussion Point 7: Are we focused enough in the recruitment campaign? (structural biology, . . .)

- SAC finds that the recruitment campaign has been very successful, especially in attracting young scientists who bring important talent and contribute to building a vibrant science program at PF.
- The strategy of using “soft money” for making term appointments is very valid and is a common means found internationally for selected augmentation of permanent base funding. It is important to use this approach judiciously and in the context of maintaining excellence of the permanent staff. While there are risks with this strategy, SAC believes that the benefits outweigh the risks.
- Recent recruitments have been of high quality and align well with the chosen areas of strategic scientific focus.
- SAC also notes that scientific staff trained and working at PF have also been able to move to other institutions with permanent positions, contributing to the growth of synchrotron-enabled science in Japan and the Pacific Rim.

Discussion Point 8: Comments on science topics and discussions with group leaders and scientists.

- SAC heard three excellent scientific presentations by H. Oshio on “Controlled intramolecular electron transfer in cyanide-bridged molecular squares”, T. Yokoyama on “Anharmonicity and quantum effects in thermal expansion of an Invar alloy studied by EXAFS and path-integral simulations” and J. Takagi on “Elucidation of cell signaling mechanism through the structural analysis of ligand-receptor complex”. These talks represent beautiful examples of world-leading research being done by PF users.

SAC Other Comments and Remarks

- SAC was very pleased to learn about the excellent progress on the fast switching project. The innovative concept behind the fast switching has provided PF with some unique and important capabilities. SAC commends the involved scientists for the strong progress in the development and implementation of this new x-ray source based on the use of double IDs that produces fast alternation of the polarization for BL-16 users. Presented results of recent measurements show highly stable beam and very good control of polarization. At the same time SAC strongly encourages the development team to make another leap in the reduction of the signal to background ratio. Going from 10^{-3} to 10^{-4} target will make this beam line a unique place in the world to conduct polarization sensitive experiments.

SAC Other Comments and Remarks (continued)

- The plans for using the last straight section that can accommodate a short undulator were presented for BL-15A. SAC was impressed by the careful process in selecting the most compelling scientific cases and judges this beam line to be state-of-the-art that hopefully will attract funding soon.
- SAC found the individual meetings with scientists extremely valuable and that they provided important insights into the operation and organization of the laboratory. SAC looks forward to having these discussions also on the agenda for its future meetings.
- At its next meeting, SAC would appreciate getting roadmaps not only for PF photon science facilities but also for other large scale facilities at KEK and, if at all possible, for photon science facilities nationwide.
- Last, but not least, SAC thanks the PF management and staff for their excellent logistical arrangements and support in preparation of the meeting. The great hospitality throughout the meeting was very much appreciated.