

Photon Factory ISAC 2010 June Meeting

Executive Summary and Closing Remarks

K. Hodgson, Committee Chairperson

June 16, 2010

ISAC Committee Members

– 5th ISAC Meeting – June 15-16, 2010

E. Fontes – Cornell University*

H. Fukuyama – Tokyo University of Science*

E. Gluskin – Advanced Photon Source

K. Hodgson – Stanford University, Chairperson

Y. Iwasawa – Univ. of Electro-Comm., Tokyo

I. Lindau – Stanford University, Vice-Chair

K. Miki – Kyoto University*

M. Mizuki - JAEA

T. Ohta – Ritsumeikan University

M. Ree – Pohang Accelerator Laboratory

V. Saile – University of Karlsruhe

*Absent for June 15-16, 2010 meeting

ISAC Perspective



- PF ISAC emphasizes that many successful accelerator developments are the direct result of the integration of the PF accelerator division into the KEK Accelerator Laboratory. AL and PF management and AD VII staff should be all commended with that success
- KEK-X offers an option for delivering more advanced photon characteristics than PF-AR and providing an intermediate strategy to bridge to the future with an x-ray ERL at KEK. However, ISAC and its LSS recognize that the operational parameters for SUPER-KEKB are evolving in ways that may not be as well matched to delivering an advanced light source in colliding mode. ISAC suggests that full technical feasibilities of KEK-X be evaluated including delivery of stable X-ray beams to a substantial number of beamlines for sufficient periods of time and that alternatives to KEK-X should be considered as well
- ISAC stresses the importance of the involvement of the broad user community in making the case for synchrotron-enabled science as relevant to the energy materials, technology, environmental and health needs of the Nation. This is essential to recognize the large capital investments needed for the future
- ISAC sees the KEK strategy together with that at SPring-8 as providing world leading capabilities over the coming decade and beyond that will serve the needs of Japan's synchrotron radiation user community. It is important that a common, user-driven strategy be developed and sustained
- PF ISAC reviewed and endorses the Report of the Light Source Subcommittee meeting that took place on February 25-26, 2010

Discussion Point 1 – Strategy of the KEK-PF (cERL/KEK-X/ERL) shown in the Roadmap of the Japanese large SR facilities presented to Science Council of Japan

- ISAC strongly supports the strategy to develop a synchrotron roadmap and have that presented to the Science Council. A first version has been presented but it is important to emphasize that this needs to be further refined with the user community and the clear purpose conveyed to the Science Council
- It is very important to continue to update and revise the roadmap to reflect both changes in the technical elements and in the political situation
- It is essential to continue to strongly engage the user input and needs in the roadmap to help guide its decision makers and its evolution. Japan's soft X-ray scientific community, in particular, must be involved in planning the future of PF
- ISAC is concerned with currently very long time between R&D on the cERL and the potential delivery of a 5-GeV class machine. We strongly encourage PF and KEK management to investigate all options to bridge the gap in the current roadmap between now and when an ERL can be operated in support of a broad science program at KEK. . An obvious option is speeding up R&D and construction of the high energy ERL for a much earlier starting date of operation for this light source

Discussion Point 2 – Evaluation of the cERL project by the Light Source Subcommittee appropriate in light of the overall scope of the KEK photon science

- There are excellent and strong reasons, technically and strategically, to move forward as aggressively as possible with the construction and commissioning of the cERL
- Successful completion of this project is an extremely important milestone for future developments of ERLs at KEK and in the world
- Specifically PF ISAC emphasizes significant progress in the development of the cERL critical accelerator components:
 - Record high performance of the high voltage gun
 - Laser-driven photocathode electron source
 - Superconducting accelerator structure
 - Cryogenic infrastructure

This remarkable progress is a clear demonstration of the qualitatively new level of interaction and cooperation of Accelerator Laboratory Divisions including Division VII

- PF ISAC commends Accelerator Laboratory Staff for establishing very productive collaborations with several Institutions that brought advanced technologies required by the cERL

Discussion Point 3 – Responses (plan) to the recommendations by the Light Source Subcommittee, Feb 2010?

- PF ISAC along with the LSS emphasizes the remarkable performance of accelerator systems at the PF - one of the world first dedicated synchrotron radiation (SR) sources. The record high and very consistent mean time between failures (MTBF), around 200 hours, is the trademark of the PF and is the gold standard for all SR sources around the world
- The staff of the Accelerator Division VII should be complimented for the diligence and dedication to their duties that result in the outstanding reliability of the PF accelerators. PF ISAC strongly recommends to maintain adequate resources for AD VII in order to preserve excellent operation record of PF and remarkable momentum of the cERL developments
- PF ISAC reviewed AD VII responses on the LSS suggestions and comments and endorses the general approach toward improvements of the PF beam stability

Discussion Point 4 – Strategy for the next phase beamlines and upgrades

- Beamline decommissioning and renewal process was continued following the ISAC 2006 recommendations
- New beamlines have to support the "Areas of Excellence" as defined by PF. Old and less productive beamlines were decommissioned. In numbers: since March 2006 the number of independent stations at the PF has decreased from 59 to 47 at 43 beamlines and from 10 to 8 at the AR
- New beamlines have come on line, including the Astellas Beamline for pharmaceutical research which is heavily used and easily meet performance goals Also new is Beamline 16A with two Apple-type undulators for fast 10 Hz polarization switching to be completed next year with the installation of the second undulator
- ISAC compliments the PF staff on these major improvements of the beamline portfolio within a few years only. The original roadmap for beamline decommissioning was even more aggressive but these achievements are remarkable in view of the rather limited number of beamline scientists and valid concerns about sensitivities of users

Discussion Point 5 – New BL13A for studies of electronic properties of organic thin films

- Japanese scientists have a long reputation in research on organic materials, bulk or thin films. In support of this research area the new VUV/SX undulator line 13A was constructed with a varied line spacing grating monochromator covering the photon energy range of 30 to 1200 eV most interesting for studying the electronic structure of such films
- Three experimental stations are available for photoelectron spectroscopy and a combination of an STM with the SR-beam for photo-induced current imaging at very high spatial resolution
- This beamline is ideal for research on organic films and has already demonstrated its capabilities in first experiments. ISAC strongly supports additional modifications and improvements on a medium range time scale such as adding a branch line and replacing the undulator by newer one

Discussion Point 6 – Progress of SBRC BL1A for low energy SAD experiments

- BL-1A. It is optimized for photon energies around 4 keV, where anomalous f and f' dispersion for important elements S and P can be used in single wavelength anomalous diffraction
- These long wavelengths pose major challenges for experiments on protein crystals such as handling and mounting of the sample, sample change, He-environment and, probably most difficult to overcome, radiation damage
- The beamline construction has proceeded very well. Routine data taking at 4 keV photon energy still needs to be demonstrated
- This is a highly challenging and risky project but well suited to a facility at the frontier of new technical developments

Discussion Point 7 – Scope and strategy of the new IMSS Detector System Development Team

- Detectors are often bottlenecks in data acquisition not only in synchrotron radiation experiments but also in other science fields. ISAC therefore highly welcomes the integrated approach of the IMSS Instrument R&D team to exploit synergies in detector development for X-rays, electrons, neutrons and muons as they are needed at the PF, J-PARC, the c-ERL and for the slow positron facility
- For synchrotron radiation applications the detector group focuses on ultra-fast signal processing for Si-ADP array X-ray detectors, for Auger electron detectors for MCD, position sensitive detectors for SAXS and time resolving detectors for fluorescence XAFS. These detectors will enable PF users to fully exploit the capabilities of the beamlines, e.g., in MCD experiments with highly specialized multi-anode MCPs
- ISAC is not only convinced that such a detector program is beneficial for PF's future but considers this development as a key element for PF's future with challenging experimental requirements at KEK-X, the c-ERL and the ERL

Discussion Point 8 – New Users Office, PAC scheme for number of publications, and relationship with the PF Users Organization

- The expansion of user office in service also seems a very positive development.
- The user community should benefit from such extended services
- ISAC continues to feel that the proposal approval rate is very high compared to international standards. The reviews may in general be too positive and ISAC suggests more critical evaluations. ISAC strongly encourages more aggressive use of data on productivity by the proposing user groups (such as publications) a valuable metric for approving further proposals and awarding beam time
- ISAC finds that the overall productivity in terms of publications is quite competitive. However, there are many beamtime proposals which fail to publish (or report publications) and efforts by PF management to improve this situation are strongly supported
- If the Users Organization is to be really effective, then the membership must be more representative. Every means to increase the percentage of users is strongly encouraged. PF management should examine other models

Discussion Point 9 – International collaborations: Australia, India, Korea, & SESAME

- The PF has done an excellent job and contributions in leading science and community services in Japan and Asian countries as well as other countries in the world for last three decade
- ISAC encourages PF to continue its great efforts in Australia, India, Korea and SESAME, and also other countries. In particular, PLS in Korea needs PF' helps and supports in the shutdown period (December of 2010 to May of 2012) for the major upgrade
- The international collaboration on the ERL technologies involving Cornell and APS has demonstrated already significant achievements. ISAC strongly encourages and supports this strategy

ISAC Other Comments and Remarks



- ISAC found the individual meetings with scientists to be very valuable and to provide important insights. Some comments will be conveyed to management separately from this report
- ISAC was pleased to hear two excellent scientific talks on layered oxide materials and chlorophyll biosynthesis
- The efforts to strengthen relationships with national universities is very positive and support for continuing this strategy are encouraged
- ISAC wishes to thank the staff for their excellent support and logistical arrangements
- ISAC wishes to members of the Committee who are rotating off after years of service (Volker Saile, Ernest Fontes, Hidetoshi Fukuyama and Toshiaki Ohta). We also thank Ingolf Lindau for assuming the role of Vice-Chair in the current committee and to become Chair for the next committee