1st Photon Factory
International Science Advisory Committee Meeting

6.5GeV PF-AR

2.5 GeV PF
## ISAC Agenda

**Tuesday April 3\(^{rd}\) 2007**

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00-9:10</td>
<td>Introduction and charge to the committee</td>
<td>Shimomura &amp; Hodgson</td>
</tr>
<tr>
<td>9:10-9:30</td>
<td>Photon Factory update</td>
<td>Wakatsuki</td>
</tr>
<tr>
<td>9:30-11:10</td>
<td>Response to the PF External Review held in March 2006</td>
<td>Wakatsuki</td>
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<td></td>
<td>The new group structure</td>
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<td></td>
<td>New schemes for communication with user community and the PF Users Organization</td>
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<td></td>
<td>(15 min discussion)</td>
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<td></td>
<td>Report on the preparation process of the strategic plan</td>
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<tr>
<td></td>
<td>(15 min discussion)</td>
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<td></td>
<td>Organization of ISAC subcommittees and the next ISAC sometime later in FY2007</td>
<td></td>
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<tr>
<td></td>
<td>(10 min discussion)</td>
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<tr>
<td>11:10-11:30</td>
<td>Coffee break</td>
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<tr>
<td>11:30-12:30</td>
<td>BL strategy and the new beam lines (PF-BL17A, BL3A, BL16A, PF-AR NW14A, NW10A, a pharma BL) and consolidation of BLs</td>
<td>Nomura</td>
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<tr>
<td></td>
<td>(30 min discussion)</td>
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</tr>
<tr>
<td>12:30-13:30</td>
<td>Lunch</td>
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</tbody>
</table>
# ISAC Agenda

**Tuesday, April 3, 2007**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Presenter/Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>13:30-15:00</td>
<td>Science topics</td>
<td></td>
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<tr>
<td></td>
<td>100-picosecond resolved X-ray studies at the beam line NW14A</td>
<td>S. Adachi</td>
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<tr>
<td></td>
<td>Symmetry breaking and interatomic resonant Auger decay in molecular inner-shell photoionization</td>
<td>A. Yagishita</td>
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<tr>
<td></td>
<td>Structural Study of Orbital-Ordered Manganite Thin Films</td>
<td>Y. Wakabayashi</td>
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<tr>
<td></td>
<td>Structural basis for knock-in-lock dynamics of RNA polymerization</td>
<td>Osamu Nureki, Titec</td>
</tr>
<tr>
<td>15:00-15:20</td>
<td>Coffee break</td>
<td></td>
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<tr>
<td>15:20-16:20</td>
<td>ERL project (including 20 min discussion)</td>
<td>Kawata &amp; Kasuga</td>
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<tr>
<td>16:20-17:00</td>
<td>Discussion with PF directorate &lt;closed session&gt;</td>
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<tr>
<td>17:00-18:00</td>
<td>Executive session &lt;closed session&gt;</td>
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<td>19:00</td>
<td>Dinner</td>
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**Wednesday April 4th 2007**

<table>
<thead>
<tr>
<th>Time</th>
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<tbody>
<tr>
<td>9:00-10:00</td>
<td>Executive session &lt;closed session&gt;</td>
</tr>
<tr>
<td>10:00-10:30</td>
<td>Summary discussion</td>
</tr>
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</table>

Report to be written by ISAC: 2 to 3 pages
Photon Factory Update
Photon Factory in the context of KEK

Tsukuba Campus

Inst of Particle and Nuclear Studies
- Belle B Factory Experiments
- Super KEKB
- ILC

IMSS
- Photon Science
- Future Light Source ERL
- Structural Biology Research Center
- Structural Materials Science Center
- Slow Positron Facility
- Neutron
- Muon

Accelerator Laboratory (KEK-B)

Tokai Campus

J-PARC KEK & JAEA
- J-PARC Center
- 3 GeV Neutron Muon
- 50 GeV
BUT...  

- The KEK budget from the MEXT decreases by 1% every year.
- The construction and operation budget of J-PARC is shared between KEK and JAEA. Hence the pressure to decrease other KEK budget.
- The budget for operation and upgrading of PF and PF-AR becomes far tighter every year.

Need for new strategies
- Establishing a new group structure
- Securing external funding
- Consolidation of BLs to decrease number of stations
- New scheme for converting public BLs to PRT(CAT)
- Use of the BLs for graduate education in collaboration with nearby universities
- New project for the next SR light source: ERL
Budget

- **Others**
- **Director General’s discretion budget**
- **Budget available for PF maintenance and R&D**
Number of Participants of PF Symposia

![Graph showing the number of participants and posters from 1999 to 2007. The number of participants increases gradually, while the number of posters increases significantly.](image-url)
Plan view of experimental halls

PF (2.5/3 GeV, 450 mA, MB(SB))
56 (48 independent) stations

PF-AR (6.5 GeV, 60mA, SB)
10 (8 independent) stations

April 2007
Number of active proposals and number of registered users

![Graph showing the number of active proposals and users over the years from 1983 to 2005.]
Chronic problem of staff shortage

Number of Stations

<table>
<thead>
<tr>
<th></th>
<th>PF</th>
<th>PF-AR</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>U</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>MPW</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>B/ VW</td>
<td>29</td>
</tr>
<tr>
<td>VSX</td>
<td>U</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>13</td>
</tr>
</tbody>
</table>

- 740 active proposals
- 3150 registered users
- Nearly no vacant BL stations

29 BL, 66 (56 independent) stations

Light Source Division

<table>
<thead>
<tr>
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<th>Exp Division</th>
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<tbody>
<tr>
<td>Researchers</td>
<td>20</td>
</tr>
<tr>
<td>Technicians</td>
<td>11</td>
</tr>
<tr>
<td>MES</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
</tr>
</tbody>
</table>

MES: Mitsubishi Electric System & Service Co. Ltd.
### Renewal of Beamlines

<table>
<thead>
<tr>
<th>FY</th>
<th>commissioned</th>
<th>decommissioned</th>
</tr>
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<tbody>
<tr>
<td>2002</td>
<td>NW12A</td>
<td></td>
</tr>
<tr>
<td>2003</td>
<td><strong>BL-5A</strong></td>
<td><strong>BL-28A, 28B</strong></td>
</tr>
<tr>
<td>2004</td>
<td><strong>BL-28A</strong></td>
<td><strong>BL-17A, 17B, 17C, 18B</strong></td>
</tr>
<tr>
<td>2005</td>
<td><strong>BL-17A</strong>, 18B, <strong>NW14A, NW10A</strong></td>
<td><strong>BL-12B, 10B, 6B, 6C</strong></td>
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<tr>
<td>2006</td>
<td><strong>BL-28B, 3A, 6C</strong></td>
<td><strong>BL-16A, 3A, 3C1, 3C2</strong></td>
</tr>
<tr>
<td>2007</td>
<td><strong>BL-16A</strong></td>
<td><strong>BL-16B</strong></td>
</tr>
<tr>
<td>2008</td>
<td><strong>NE3A</strong></td>
<td><strong>NE3A</strong></td>
</tr>
<tr>
<td></td>
<td>(<strong>BL-1A, BL-13, NE1</strong>)</td>
<td>(<strong>BL-1C, 13A, 13B1, 13B2, 13C, NE1A1, NE1A2, NE1B</strong>)</td>
</tr>
</tbody>
</table>

*Underlined: completely funded by or augmented by external funding*
New Insertion Device beamlines

PES: Photoelectron Spectroscopy
ARPES: Angle-Resolved PES
PEEM: Photo-electron emission microscopy

2004 ARPES

2006 materials structure science

BL-3

2005 structural biology

BL-17

2007 fast polarization switching

BL-16

ID sections

5.0m x 2  4.3m x 4  3.7m x 2

9.0m x 2  5.7m x 4  5.1m x 2  1.4m x 6
Machine developments/Improvements in FY2006

PF (2.5GeV)
- A short gap undulator(#3) was installed.
- A series of experimental studies for “Top-up” has been executed.
- A kicker for a longitudinal bunch-by-bunch feedback system was installed.
- The RF power source was partly renewed.

PF-AR (6.5GeV)
- An undulator with new magnet arrangement for polarization control was successfully tested.
- An in-vacuum undulator was installed on NW14.
- The power supply for the B magnets was renewed.
PF 2.5 GeV Top-Up Operation Project

KEK Linac supplies four rings.
KEKB 8GeV $e^-$ / 3.5GeV $e^+$
Continuous injection mode (CIM)
PF 2.5GeV $e^-$ / PF-AR 3GeV $e^-$ (ramp to 6.5GeV)
(1-2 injections/day) (2 injections/day)

Top-up
Phase 1
• Fast switching from CIM of KEKB to PF injection mode has been already realized

Phase 2 (from ’08 autumn)
• Acceleration of beams with different energies in the Linac (under test)
• High speed switching magnet

Phase 3 (dates to be decided)
• Simultaneous acceleration of $e^+/e^-$ beams with different energies
Top-up (Phase 2)

Phase 2

<table>
<thead>
<tr>
<th>e⁻ inj.</th>
<th>switch to e⁺</th>
<th>e⁺ inj.</th>
<th>switch to e⁻</th>
<th>e⁻ inj.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 min.</td>
<td>30 sec.</td>
<td>4 min.</td>
<td>30 sec.</td>
<td>1 min.</td>
</tr>
</tbody>
</table>

KEKB HER KEKB LER KEKB HER
PF          KEKB LER          PF

1 mA = 450 mA
Summary of BL activity

Publications

- PF
- SPring-8
- APS
- ALS
- ESRF
- Elettra
- NSLS
- SSRL

ESRF
APS
PF
NSLS
ALS
SPring-8
SSRL
Elettra

published year
publication number


2007/3/9
Structure and function of the histone chaperone CIA/ASF1 complexed with histones H3 and H4

Ryo Natsume\textsuperscript{1,*}, Masamitsu Eitoku\textsuperscript{2,*}, Yusuke Akai\textsuperscript{1}, Norihiko Sano\textsuperscript{2}, Masami Horikoshi\textsuperscript{2-3} & Toshiya Senda\textsuperscript{4}

Insulin receptor ectodomain structure, McKern et al. (CSIRO, Australia), Nature 443, 218-221, Sep 14, 2006

The First In-Situ Time-Resolved Observation of the Structure and Reaction Kinetics on the Cathode Surfaces in a Pt/C Fuel Cell, Mizuki Toda, et al. (Univ of Tokyo), Angew. Chem. Int. Ed., to be published, Mar 23, 2007

Xe 4d² core-core double photoionization, Y. Hilosaka, etal., PRL, accepted. (PF, K. Ito Group)
Response to the PF External Review held in March 2006
The 2.5 GeV and 6.5 GeV Storage Rings

The Committee observes great success in the incremental upgrade program of the PF 2.5 GeV ring. This upgrade makes PF fully competitive with other intermediate energy 3rd generation light sources in the world in many research fields.

The Committee suggests that a reasonable number of beam lines for a facility of the scale and scope of the PF might be around 30-40 and there could be around 5-10 selected areas of excellence. The structural biology model has proven to be a very successful and exemplary approach.

Response:
Introduction of a new group system and BL consolidation/construction
Executive Summary of the PF External Review March 2006

The 2.5 GeV and 6.5 GeV Storage Rings

While the Committee acknowledges the quality of science done at the PF-AR, including structural biology and the international interest in new possibilities in time-resolved experiments, we urge the PF management to consider of the value of further expanding this investment relative to developing new ID beam lines on the 2.5 GeV ring, allocation of resources to the ERL prototype development and in the broader context of SR facilities in Japan.

Responses:

- Emphasis on the unique capabilities of the PF-AR running always in the single-bunch mode: NW14A is attracting many users from abroad.
- Refurbishment of PF-AR North-East Building, in part, to solve the hybrid problems.
  ⇒ Wish to continue operation of PF-AR as long as possible (to overlap with the first phase of ERL operation).
Role of Photon Factory in Japanese SR Community

The decision by the University of Tokyo not to build a new 3rd generation VUV/soft x-ray facility has given PF the opportunity and responsibility to take the lead in further developing this important research field in Japan – additional resources should be sought for this effort so as not to compromise the x-ray program or the R&D on the ERL.

Responses:
- Formation of the Electronic Properties Group
- Use of medium and long straight sections: BL2, BL13, BL16, BL 28
- Solving the hybrid use of BLs (MPW vs undulator, optics and experimental setups) by consolidation of BLs
- Establishing stronger and more extensive collaboration with user groups (eg. SR Initiatives of the University of Tokyo)
A balanced strategic plan thus needs to be prepared and implemented that builds on the staff at PF and the world class groups in the region. Given the severe funding constraints, the relatively large investment in operations of the PF-AR should be critically reviewed and compared with other options (e.g. SPring-8). A resource re-allocation could be one strategy to make urgently needed human and financial resources available for the ERL prototype R&D and/or additional state-of-the-art ID beam lines on the 2.5 GeV ring.

Responses:
- Wish to continue operation of PF-AR and limited range of BL reconstruction paying attention to cost performance
- Transferring activities from PF-AR to other facilities including 2.5 GeV PF ring, SPring-8 after serious evaluation of scientific outlook of the relevant scientific areas
- Top-up operation of the 2.5 GeV PF ring (late 2008)
- Finish preparing the action plan
The new group structure
### PF Members as of April 1, 2007: Permanent Staff

<table>
<thead>
<tr>
<th>Electric Properties</th>
<th>Structural Material Science</th>
<th>Chemistry</th>
<th>Life Sciences</th>
<th>Future Light Source (Imaging &amp; Dynamics)</th>
<th>Cutting Edge Technologies, Infrastructure and Safety</th>
<th>User Operation &amp; Dissemination</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professors</td>
<td>○Nasu, ○Yagishita</td>
<td>○Sawa</td>
<td>Olida, Nomura</td>
<td>Wakatsuki</td>
<td>○Kawata</td>
<td>Matsushita</td>
<td>8</td>
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<tr>
<td>Lecturers</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>1</td>
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<tr>
<td>Institutional Lecturers</td>
<td></td>
<td>H. Adachi</td>
<td>Hiraki, Igarashi</td>
<td></td>
<td>Hyodo, Zhang</td>
<td></td>
<td>5</td>
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<tr>
<td>Engineers &amp; Technicians</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10</td>
</tr>
</tbody>
</table>

| No. of faculty members | 9 | 5 | 3 | 7 | 5 | 6 | 3 | 38 |
| No. of part time      | 4 | 1 | 0 | 2 | 3 | 0 | 0 | 10 |
| No. of technical staff|   |   |   |   |   | 10|   | 10 |

- Slow Positron
  - Lecturer
    - Kurihara

<table>
<thead>
<tr>
<th>Lattice</th>
<th>RF</th>
<th>Vacuum &amp; Front Ends</th>
<th>Beam Instrumentation</th>
<th>Insertion Device</th>
<th>Future Light Source</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professors</td>
<td>○Kobayashi</td>
<td>○Izawa</td>
<td>○Maezawa</td>
<td>○Mitsuhashi</td>
<td>○Yamamoto</td>
<td>○Kasuga</td>
</tr>
<tr>
<td>Assoc. Professors</td>
<td>○Kobayashi</td>
<td>Sakanaka</td>
<td>Honda</td>
<td>Park</td>
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<tr>
<td>Institutional Lecturers</td>
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<tr>
<td>Assist. Professors</td>
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<tr>
<td>Technical Staff</td>
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</table>

| No. of faculty staff | 3 | 3 | 4 | 4 | 3 | 1 | 18 |
| Part time | | | | | | | 0 |
| No. of technical | 2 | 1 | 3 | 4 | 1 | 0 | 11 |
New schemes for communication with user community and the PF Users Organization
### 21 User Groups of PF Users Organization

<table>
<thead>
<tr>
<th>Group</th>
<th>No. of members</th>
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<tbody>
<tr>
<td>1 XAFS</td>
<td>125</td>
</tr>
<tr>
<td>2 Small Angle X-ray Scattering of Enzymes</td>
<td>14</td>
</tr>
<tr>
<td>3 Protein Crystallography</td>
<td>26</td>
</tr>
<tr>
<td>4 Small Angle X-ray scattering</td>
<td>28</td>
</tr>
<tr>
<td>5 Radiation Biology</td>
<td>16</td>
</tr>
<tr>
<td>6 Powder Diffraction</td>
<td>14</td>
</tr>
<tr>
<td>7 High Pressure Science</td>
<td>43</td>
</tr>
<tr>
<td>8 Material Structure Science</td>
<td>45</td>
</tr>
<tr>
<td>9 Compton Scattering</td>
<td>9</td>
</tr>
<tr>
<td>10 Surface Chemistry</td>
<td>33</td>
</tr>
<tr>
<td>12 Solid State Spectroscopy II</td>
<td>5</td>
</tr>
<tr>
<td>13 Atomic &amp; Molecular Physics</td>
<td>31</td>
</tr>
<tr>
<td>14 X-ray Fluorescence Analysis</td>
<td>To be renewed</td>
</tr>
<tr>
<td>15 Quantum Nano Spectroscopy</td>
<td>40</td>
</tr>
<tr>
<td>16 Nuclear resonance scattering</td>
<td>9</td>
</tr>
<tr>
<td>17 Phase Imaging</td>
<td>24</td>
</tr>
<tr>
<td>18 Slow Positron</td>
<td>17</td>
</tr>
<tr>
<td>19 Medical Applications</td>
<td>26</td>
</tr>
<tr>
<td>20 X-ray Reflectivity</td>
<td>Cease/re organize</td>
</tr>
<tr>
<td>21 Soft X-ray Emission Spectroscopy</td>
<td>17</td>
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</table>

568 out of 652 PF UO members belong to the User Groups
PF UO registered users

(numbers)

Fiscal Year

- Special Members
- Supporting Members
- Student Members
- PF Members
- General Members

1999 2000 2001 2002 2003 2004 2005 2006
Report on the preparation process of the strategic plan
Key factors for BL construction and consolidation

1. Construction and enhancement of beam lines taking advantage of the longer and new straight sections
2. Optimization of BLs by resolving the hybrid use of insertion devices, optics and experimental setups
3. Seeking external funding to build new BLs in collaboration with user groups
4. Consolidation and/or closure of BLs whose activities are best exploited in other SR facilities.
5. Consolidation of BLs with lower activities and/or demands
6. New scheme for converting public BLs to PRT(CAT)
7. Use of BLs for graduate education of nearby universities
Six stages to discuss the strategic plan

1. SR Strategy Working Group (reports to the IMSS Director)
2. Corresponding Internal Committee within the PF to prepare proposals to the SR Strategy WG
3. Projects XYZ: proposals of new BL projects from the PF staff
4. Proposals from external user groups through PF Users Organization and its User Groups
5. PF International Science Advisory Committee (ISAC)
6. IMSS Management Committee (Un-ei Kaigi)
Institute of Material Structure Science
Strategic Planning Working Groups

**Background**
Photon Factory: Need to discuss and refine Photon Factory’s strategic plan following the International External Review held March 2006, and new proposals for new BLs/stations such as Univ. of Tokyo SR Initiatives and Target Protein Project of the MEXT.

J-PARC: Timely advice on beam line planning and construction, and principle of operation, proposal review committee etc..

**Mission**
Discuss and endorse strategies and priorities of projects specific to PF or J-PARC and future directions of the IMSS

Reports to the Director of the IMSS
Results are discussed in the IMSS Management Committee (Un-ei Kaigi) Members are selected from the IMSS Management Committee and the PF management team.
Committee meetings are open to the IMSS staff as observers.
Synchrotron Radiation Strategy Working Group

Mission: Advice on the science programs of the PF and the PF-AR including beam line construction, consolidation and refurbishment

Members: Asakura (Hokkaido), Amemiya (Univ of Tokyo), Oshima (Univ of Tokyo), Kosugi (UV-SOR), Sakata (Nagoya Univ), Takata (SPring8), Tsukihara (Osaka Univ), Murakami (Tohoku Univ), Miki (Kyoto), and PF directorate (Wakatsuki, Kasuga, Nomura, Kawata)

J-PARC Strategy Working Group

Mission: Advice on the neutron and muon science and the operation of J-PARC MLF (Materials and Life Science Facilities)

Members: Arai (JAEA), Torikai, Nishida, Fukunaga, Yoshizawa, and from IMSS, Ikeda, Nishiyama and Kamiyama
SR Strategy WG Internal Committee

- Formed according to IMSS director’s request
- Mission: discuss the PF Directorate’s proposal, improve/modify and propose a refined proposal to the SR Strategy WG

_In the interim_
- One-year tenure synchronized with the SR Strategy WG
- Chair: Hiroshi Kawata
- Additions: K. Mase, K. Ono, H. Sawa, T. Iwazumi, S. Shinichi, S. Yamamoto to include younger generation and cover wider areas of expertise.
- August 31, 2006 it was expanded to all the professors and associate professors of the PF

_From April 1, 2006_
- Under the new group structure, the SRSWG Internal Committee will be replaced by the group leader meeting chaired by PF director, S. Wakatsuki.
SR Strategic Planning WG: Internal Meetings

1\textsuperscript{st} Meeting, Tue, July 24, 2006
Attendees: Wakatsuki, Nomura, Matsushita, Iida, Kasuga, Maezawa, Yagishita, Sawa, Ito, Mase, Ono, Iwazumi, Shinichi Adachi, Kawata
\textbf{Hearing and discussion on the pharma beam line}

2\textsuperscript{nd} Meeting, Thu, August 31
Attendees: Wakatsuki, Nomura, Matsushita, Iida, Kasuga, Maezawa, Yagishita, Sawa, Ito, Mase, Ono, Iwazumi, Shinichi Adachi, Yamamoto, Kawata
\textbf{Discussion on the general concept of Projects XYZ}

3\textsuperscript{rd} Meeting, Tue, September 12
Attendees: Professors and Associate Professors
\textbf{Discussion on the concept and procedures for building new beamlines and consolidation of existing beam lines}

4\textsuperscript{th} Meeting, Thu, September 21
Attendees: Professors and Associate Professors
Proposers: Seto (Kyoto Univ), Kobayashi (Hyogo Prefecture Univ), Yamada
\textbf{Hearing and discussion on the Mossbauer activities and the pharma beam line proposal}

5\textsuperscript{th} Meeting, Fri, September 22
Attendees: Professors and Associate Professors
Proposers: Mase, Hyodo, Ono, Nomura & Kosuge

6\textsuperscript{th} Meeting, Fri, September 29
Attendees: Professors and Associate Professors
Proposers: Kishimoto, Shinichi Adachi, Inada, Kobayashi, Yagishita, Matsugaki
\textbf{Discussion on proposals for Projects XYZ}
Projects XYZ

Solicit proposals from the PF staff as high priority projects, such as refurbishment of existing BL or station, light source development R&D, to be completed within 3 years from FY 2007 with the aim of obtaining significant external funding. Budget from PF will be on the order of US$ 100,000 which can be regarded as matching fund.

- Proposer(s) must be PF staff
- Proposals should include
  - importance and urgency of the science and/or R&D,
  - detail of the project,
  - Yearly plan and milestones
- Budget request to PF (ca. or above US$80,000 total)
- Strategy for acquiring external funding
- Work plan of each participating staff
- Commitment/collaboration of external users
- Proposal due: June 11, 2006
<table>
<thead>
<tr>
<th>Title</th>
<th>Proposers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Soft X-ray Spectroscopy of Organic Thin Layers on BL13</td>
<td>K. Mase</td>
</tr>
<tr>
<td>2 Refurbishment of BL14C for imaging techniques and a new station for high pressure application</td>
<td>K. Hyodo &amp; T. Kikegsawa</td>
</tr>
<tr>
<td>3 Refurbishment of PF-AR NE1A2 for clinical applications</td>
<td>K. Hyodo, H. Sugiyama &amp; M. Ando</td>
</tr>
<tr>
<td>4 Further development of AR-NE3 SR Mossbauer spectroscopy beamline</td>
<td>S. Kishimoto &amp; Z.-W. Zhang</td>
</tr>
<tr>
<td>5 Development and application of sub pico-second X-ray pulses using PF beam transfer section</td>
<td>T. Mitsuhashi &amp; S. Adachi</td>
</tr>
<tr>
<td>7 Time resolved XAFS for studies on reaction mechanisms</td>
<td>Y. Inada &amp; M. Nomura</td>
</tr>
<tr>
<td>8 Refurbishment program of XAFS beam lines, Part I</td>
<td>M. Nomura</td>
</tr>
<tr>
<td>9 Improvement of the XAFS beam lines Part II: fluorescence XAS system</td>
<td>M. Nomura</td>
</tr>
<tr>
<td>10 STARS (Simple Transmission and Retrieval System) for beam line control</td>
<td>T. Kosuge, K. Nigorikawa, Y. Saito</td>
</tr>
<tr>
<td>11 Upgrading BL-28 undulator and development of photo electron spectroscopy with laser synchronization</td>
<td>K. Ono</td>
</tr>
<tr>
<td>12 X-ray nano imaging using soft X-ray PEEM</td>
<td>K. Ono</td>
</tr>
<tr>
<td>13 X-ray micro beam development for investigation of radiation induced cell response</td>
<td>K. Kobayashi</td>
</tr>
<tr>
<td>14 Atomic and molecular science of multi electron processes of atomic</td>
<td>Y. Azuma &amp; K. Ito</td>
</tr>
<tr>
<td>15 Microfocus protein crystallography beam line</td>
<td>N. Igarashi et al.</td>
</tr>
<tr>
<td>16 Upgrade of SAXS beam line BL15</td>
<td>H. Okuda, K. Wakabayashi, Y. Amemiya, &amp; S. Ueno (external proposal)</td>
</tr>
<tr>
<td>17 Upgrade of soft X-ray undulator beam line BL-2</td>
<td>A. Yagishita</td>
</tr>
</tbody>
</table>

Prioritization and implementation to the action plan being discussed.
Learning from examples
How we proceeded with the proposal of the Astellas Pharma BL and the future actions and implications.

Summary

Proposed ports: either PF BL13 or PF-AR NE3.
Discussion in the SR Strategy WG internal committee
- Whether PF should accept such a proposal.
- Future prospects of the two BLs including hearing
- Wishes and proposals of users potentially affected by construction of the Pharma BL: Compton, Moessbauer, high pressure, surface chemistry etc.

The proposal to build it on NE3 endorsed by the 1st SR Strategy WG.
Learning from examples, continued

Statistics of experimental proposals on protein crystallography beam lines at PF

![Graph showing statistics of experimental proposals on protein crystallography beam lines at PF. The graph compares accepted proposals and the sum of running proposals over different years and rounds, with a focus on years 2001 to 2007.](image-url)
Industrial Use and Collaborations between KEK and Industry (~8% of beamtime)

MX BLs at Photon Factory

- Astellas Pharma. Beam Line AR-NE3 (to be completed by March 2009)
- Tsukuba Structural Biology Consortium for Industrial Applications (since April 1, 2006)
- Pharmaceutical Consortium for Protein Structure Analysis (PCProt), Japan Pharmaceutical Manufacturers Association (JPMA)
- BL32B2 at SPring8

New members

Ajinomoto Co., Inc
Astellas Pharma Inc.
Eizai Co. Ltd.
KYOWA HAKKO KOGYO Co., LTD.
DAIICHI SANKYO Co., Ltd.
CHUGAI PHARMACEUTICAL Co., Ltd.
BANYU PHARMACEUTICAL Co., Ltd.
Mitsubishi Chemical Corporation

Learning from examples, continued
Discussion processes of the SR Strategy WG internal meetings concerning construction of the Astellas Pharma BL

Conclusions of the 1st SR Strategy WG internal meeting
1) The PF should make efforts in accepting the offer of the Pharma beam line as part of the long term strategy of PF to attract external funding.
2) It is important to dedicate medium- and long- straight sections of the PF 2.5 GeV ring for VUV/SX activities.
3) Continue the discussion on the proposal of building the pharma beam line for the case that it is to be built on NE3.

<Problems>
1) A mechanism for proposers to rebut the decision of the committee should be in place.
2) If the beam line concerned with the consolidation is mainly driven by external users, the PF should pay particular attention to hearing their opinions and counter proposals.

2nd SR Strategy WG internal meeting
Heard the scientific activities of Mossbauer spectroscopy on the current NE3 station. Re-discussed the site selection of the Pharma BL with the relevant PF staff.
The 4th SR Strategy Committee Internal meeting

Hearing of the proposals by
Seto (Kyoto Univ), Kobayashi (Hyogo Prefecture Univ)
Yamada (PF, Structural Biology)

And discussion on the Mossbauer activities and the pharma beam line proposal

Conclusions:
1) Following the recommendation of the PF-External Review in March last year that PF should play a pivotal role in leading the sciences in the VUV/SX region, PF’s strategy should be to keep BL13 as a dedicated undulator beam line for soft matter thin layer applications.
2) NE3 presents as the best port for the proposed pharma beam line.
3) Consolidation of the Mossbauer spectroscopy of NE3 and high pressure activities on BL13 to build a new station on NE1 should be evaluated. Also, the possibility of performing Mossbauer experiments on NW2 should be kept open.
4) Kishimoto’s proposal to the Projects XYZ should be reevaluated in a revised form incorporating relocation/merger to NE1.
To be completed by March 2009.
Astellas Pharma will have priority access for certain amount of beam time during 10 years from April 2009.
The remaining beam time can be used for general user operation including use by other pharmaceutical companies.
Press release on October 26, 2006. Featured in Nikkei, Nikkei Industrial, Daily Industry, Joho, NHK (online)
Future directions of the Scientific Activities of NE1 (under discussion)

NE1A redevelopment

- PF-AR NE1A1 had played a pioneering role in Compton scattering science and transfer of the NE1A1 activities to BL08W of SPring-8 for further development will best serve the community (We have had discussions with the Compton UG)
- XMCD activities on NE1B will be transferred to the new BL16A with an Apple-II type undulator (to be expanded to a fast switching twin undulators)
- Medical applications (coronary angiography) on NE1A2 using the underground hutch for patients will reach the end of its program in about one year. Further development in the area of medical applications will be better suited if the station is extended to the ground level where patients access is much easier and there will be no conflict of beam time with the rest of the AR stations. The extension plan depends on initiatives of University of Tsukuba Hospital.
Future Possibilities of Medical Applications at PF-AR NE1A2
To be lead by University of Tsukuba Hospital

Medical applications (coronary angiography) on NE1A2 using the underground hutch for patients will reach the end of its program in about one year. Further development in the area of medical applications will be better suited if the station is extended to the ground level where patients access is much easier and there will be no conflict of beam time with the rest of the AR stations. The extension plan depends on initiatives of University of Tsukuba Hospital.
Future directions of the Scientific Activities of BL13 (under discussion)

BL13 to be dedicated to surface chemistry using undulator, potential to become one component of PF VUV-SX flagship

• BL13A high pressure earth science research (30 ~40 keV) using diamond anvil cell (DAC) with laser heating will be moved to NE1A. Moessbauer spectroscopy on electronic/spin-state studies of Fe which will be transferred from NE3 and merged with the DAC activities.
• BL13B1 and BL13B2 XAFS activities will be absorbed into the other PF and PF-AR beam lines.
• These will solve the hybrid problem of the current BL13 insertion device by dedicating it to surface chemistry applications on BL13C in the undulator mode only.

As a net result, the whole process will decrease the number of stations by 4.
**User-Group Operated Beam Lines**

<table>
<thead>
<tr>
<th>Station</th>
<th>Working Group</th>
<th>PI</th>
<th>Host UG of the PF UO</th>
<th>Corresponding PF staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>BL-10C</td>
<td>SAXS of Enzymes WG</td>
<td>S. Nojima (Titec)</td>
<td>SAXS of Enzymes</td>
<td>K. Kobayashi</td>
</tr>
<tr>
<td>BL-13C</td>
<td>Soft X-ray CGM spectrometer WG</td>
<td>H. Shimada (AIST)</td>
<td></td>
<td>K Mase</td>
</tr>
<tr>
<td>BL-15A</td>
<td>SAXS WG</td>
<td>H. Okuda (Kyoto U)</td>
<td>SAXS</td>
<td>R. Kato</td>
</tr>
<tr>
<td>BL-14C2/AR-NE5C</td>
<td>High Temp High Pressure WG</td>
<td>K. Kusaba (Tohoku U)</td>
<td>High Pressure Science</td>
<td>T. Kikegawa</td>
</tr>
<tr>
<td>BL-6C</td>
<td>Material Physics WG</td>
<td>S. Sasaki (Titec)</td>
<td></td>
<td>H. Sawa</td>
</tr>
</tbody>
</table>

* Interested users volunteer forming WGs to participate not only in the maintenance of the hardware but also in help and education of new users.

* The PF provides budget for maintenance of the stations and travel support for the WG members for maintenance of the User-Group operated stations. Members of the WG can apply for privileged beam time as the PF staff.
New Comprehensive System for PRT/CAT BLs
(to be refined and discussed!)

<table>
<thead>
<tr>
<th>Type</th>
<th>Construction cost paid by</th>
<th>Maintenance cost covered by</th>
<th>Personnel responsible</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>PF</td>
<td>PF</td>
<td>User group(s)</td>
</tr>
<tr>
<td>II</td>
<td>PF</td>
<td>User group(s)</td>
<td>User group(s)</td>
</tr>
<tr>
<td>III</td>
<td>User group(s)</td>
<td>PF</td>
<td>User group(s)</td>
</tr>
<tr>
<td>IV</td>
<td>User group(s)</td>
<td>User group(s)</td>
<td>User group(s)</td>
</tr>
</tbody>
</table>

- **Insertion device**
- **Front ends**
- **Optics**
- **Exp Hutch**

Sub-type
- **A** (movable apparatus)
- **B** (fixed apparatus)
- **C**
- **D**

**Question:** Who will bear the cost and human resources after the completion of the project?
Travel support for PF users

- Support level for FY 2007:
  - Beam time < 48 H: 2 persons
  - 48 ~ 96 H: 3 persons
  - > 96H: 4 persons
- It may be reduced depending on the FY2007 budget
Proposals from outside institutes to construct BLs

- SRRO, Univ. of Tokyo
  surface/interface, XMCD

- Saha Institute of Nuclear Physics (India)
  crystal/powder diffraction, XAFS, diffuse scat.

- Catalysis Research Center, Hokkaido Univ.
  XAFS, IR etc. dedicated for catalysis research

- Discussion with Ibaraki Prefecture (local government) on industrial use of the PF & PF-AR
Post Protein3000 Project (2007-2011)

<table>
<thead>
<tr>
<th>Targets:</th>
<th>Medical importance/relevance</th>
<th>Food and environment</th>
<th>Fundamental Biology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein Production</td>
<td>Structural Analysis (X-ray, NMR, EM)</td>
<td>Functional Control (Chem. Library)</td>
<td>Informatics</td>
</tr>
</tbody>
</table>

Joint Proposal (FY2006) by SPring-8 and PF: New Beam Lines

1. To be completed by 2009
2. Compatibility: SPring-8 and PF robots
3. Remote access and control

Isao Tanaka, Hokkaido Univ
Kunio Miki, Kyoto Univ
Atsushi Nakagawa, Osaka Univ.
High precision monochromators for micro beam using cryogenic cooling (SPring-8)

Development of super precision (sub micron) diffractometer for micro crystals (PF)

Remote access and control
Mail-in and remote data collection
(Hokkaido Univ, Kyoto Univ, & Osaka Univ)

To be proposed to “Target Protein Research Project Program” FY2007-FY2011, but BL construction complete by March 2010

Kick-off in FY2006: “SR X-ray Protein Crystallography Techniques for difficult targets”
Goals of BL upgrade and consolidation (to be discussed!)

- Solving hybrid use of insertion device (e.g., BL13) by dedicating the insertion device to one mode of operation.
- Timely construction of two remaining short gap undulator beam lines (BL1 and BL15) as well as transfer/consolidation/close-down of beam lines affected by the new undulator BLs.
- Closing down BLs with low activities or with few user groups.
- Convert BLs with less demands but nevertheless producing good quality science or those with unique capabilities to PRT (CAT) beam lines

Specialized beam line catered for graduate education

Possibility of funding: JSPS’s “Attractive Graduate Education” Initiative

while keeping in mind the cost for running such BLs.

- As a result of the BL construction and consolidation, we aim to decrease the number of stations by 10 to 15 in 3~5 years, i.e. 51 to 56 stations from the current total of 66 stations and concurrently operational stations 53.
Number of experimental stations

These numbers include (currently 14) stations operated by external users.
## Beamlines

**number of stations**

<table>
<thead>
<tr>
<th></th>
<th>PF</th>
<th>PF-AR</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>U</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>MPW</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>B/VW</td>
<td>29</td>
</tr>
<tr>
<td>VSX</td>
<td>U</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>13</td>
</tr>
</tbody>
</table>

**Stations with external support**

<table>
<thead>
<tr>
<th></th>
<th>PF</th>
<th>PF-AR</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>U</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>MPW</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>B/VW</td>
<td>2+4</td>
</tr>
<tr>
<td>VSX</td>
<td>U</td>
<td>2+1</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>3+0</td>
</tr>
</tbody>
</table>

29 BL, 66 (56 independent) stations

funded by external groups (AIST, ASRP, Univ. of Tokyo, JST)
supported by external groups 8+6 = 14
Organization of ISAC subcommittees and the next ISAC sometime later in FY2007
Organization of ISAC subcommittees and the next ISAC sometime later in FY2007

• 2 year period
• Question: Is there a need to add a few more members for continuation?

Earnest Fontes – Cornell High Energy Synchrotron Source
Hidetoshi Fukuyama – Tokyo University of Science
Keith Hodgson – Stanford University, Chair of the Committee
Hiromichi Kamitsubo – Riken Wako Institute/Saga Light Source
Gerhard Materlik – Diamond Light Source
Toshiaki Ohta – Ritsumeikan University
Volker Saile – University of Karlsruhe
Hiroyoshi Suematsu – Riken Harima Institute
Kunio Miki – Kyoto University (replacing Prof. T. Tsukihara)
Ingolf Lindau – SSRL (replacing Dr. Neville Smith, ALS)
Planning for ISAC Subcommittees (to be discussed)

- Evaluate and give advice on beam lines, science outputs by users and by the PF staff, corresponding parts in the PF strategic plan.
- The subcommittees report to the International Science Advisory Committee.
- Each subcommittee consists of 3 to 5 experienced scientists. Ideally each member of the ISAC will belong to one subcommittee.
- Each subcommittee will meet for one or one & half days including a facility tour, and be coupled with the main ISAC.
- For the first time, it may be better that all the subcommittees will meet just before the next ISAC, later this year, prior to the second ISAC. Question is how much time we need to have between the subcommittees and ISAC.
- Proposals of the subcommittee topics
  - Electronic properties (solid state, gas and molecular physics, surface & theory)
  - Structural material science
  - Chemistry (particularly XAFS, X-ray fluorescence analysis )
  - Life sciences (structural biology and radiation biology)
  - Medical sciences (including angiography & tech. developments for imaging)
  - Machines