2. PRESENT STATUS OF THE PHOTON FACTORY

2.1 Organization

In April 1, 1997, National Laboratory for High Energy Physics (the former KEK) and two institutions of the University of Tokyo (the Institute for Nuclear Study and the Meson Science Laboratory) were merged, and a new organization, High Energy Accelerator Research Organization (KEK) was launched. It consists of four research institutions; the Institute of Materials Structure Science (IMSS), the Institute of Particle and Nuclear Studies, the Accelerator Laboratory, and the Applied Research Laboratory. The Photon Factory (PF) is now a part of the IMSS together with the Neutron Science Laboratory and the Muon Science Laboratory, as shown in Fig. 1. At the time of this merging, KEK was operated under the Ministry of Education, Culture, Sports, Science and Technology (MEXT), and it has become an Inter-University Research Institute Corporation without any major change in its organization since 2004.

The organizational chart of the PF is shown in Fig. 2. The PF consists of three divisions; the Synchrotron Radiation Science Divisions I and II, and the Light Source Division. The Light Source Division is responsible for operating the PF Storage Ring and for research and development (R&D) of accelerators related with SR, and collaborates with the Accelerator Laboratory in operating, maintaining and remodelling the PF-AR. In the Light Source Division, 18 scientific and 11 technical staff members are working as presented in Fig. 2. The Synchrotron Radiation Science Divisions I and II are responsible for the operation of beamlines, experimental support of users and R&D for synchrotron instrumentation. There are 41 scientific and 10 technical staff members in the two divisions. Table 1 shows the change in the number of staff members for the period 1985-2005. The positions of post-doctoral fellows (COE fellows) were approved by the Government in 1997, which contributes to the increase in the total staff members. The number of the total branch beamlines is 69, the number of staff including the postdoctral fellows in the Synchrotron Radiation Science Divisions I and II per branch beamline is close to 0.8, which is much less than that in other facilities throughout the world. What is even worse, the Government obliges us to cut 1% of labor cost every year. In this situation, how can we survive?

2.2 Users Experimental Program

The PF principally accepts experimental proposals from universities and public research institutes, irrespective of nationality. The proposals from any private company, if their purpose is purely academic, can be accepted. In addition to these academic proposals, there are two categories reserved for SR use by private companies. They can submit a proposal in collaboration with PF staff members. Alternatively, they can submit their own proposals, but in this case, machine time is charged.

The experimental proposals are classified into five categories as follows;

General (G) Proposals of general and standard category.

Preliminary (P) Proposals for feasibility studies prior to G and S proposals, and for inexperienced SR users.

Special (S)

S1: Proposals of excellent quality including the construction of beamlines or experimental apparatuses, which will serve general users after the completion of the project.

S2: Proposals of excellent quality, which require full use of SR and a large amount of beam time.

Urgent (U) Proposals which are exceedingly important and urgently require beam time.

The closing date for these proposals is set twice a year, except for U category proposals, which are accepted at anytime. All the proposals are reviewed by the

Table 1 Variation in the number of the PF staff members since 1985.

		1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Professor	Light Source Division	4	2	4	4	2	5	5	4	5	6	5	6	4	4	4	4	4	4	4	3	3
	Synchrotron Radiation Science Divisions I & II	2	4	5	6	6	7	6	8	10	9	9	8	7	7	9	10	9	9	9	9	10
Associate Professor	Light Source Division	5	5	3	3	5	4	4	3	3	3	3	3	3	4	4	4	4	6	6	6	7
	Synchrotron Radiation Science Divisions I & II	5	7	9	8	7	9	9	10	10	10	10	9	9	9	8	9	8	11	12	12	11
Research Associate	Light Source Division	8	9	10	12	10	10	11	12	12	12	12	11	11	10	10	9	9	9	8	8	7
	Synchrotron Radiation Science Divisions I & II	10	11	11	15	14	15	15	14	17	18	18	17	19	20	20	22	21	20	19	20	19
Technical Staff	Light Source Division	6	7	8	8	10	10	10	10	10	9	10	9	8	9	10	11	11	11	11	11	11
	Synchrotron Radiation Science Divisions I & II	4	8	9	11	10	9	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Posdoc (COE staff)	Light Source Division													0	0	0	0	0	0	0	1	1
	Synchrotron Radiation Science Divisions I & II													4	6	7	7	6	9	7	6	5
Total		44	53	59	67	64	69	70	71	77	77	77	73	75	79	82	86	82	89	86	86	84

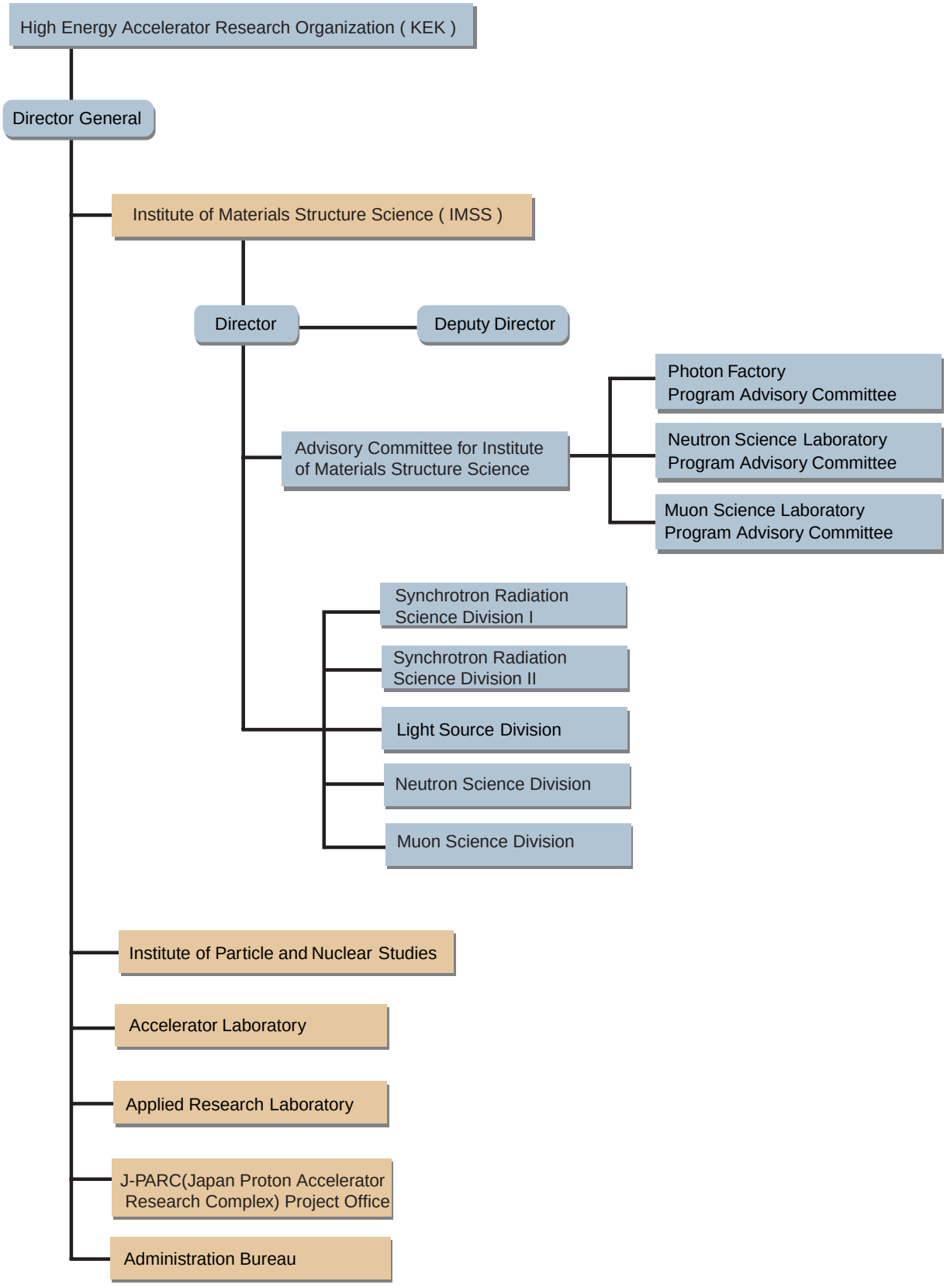


Figure 1
Organization chart of High Energy Accelerator Research Organization, as an Inter-University Research Institute Corporation since April 2004, consisting of four research institutions.

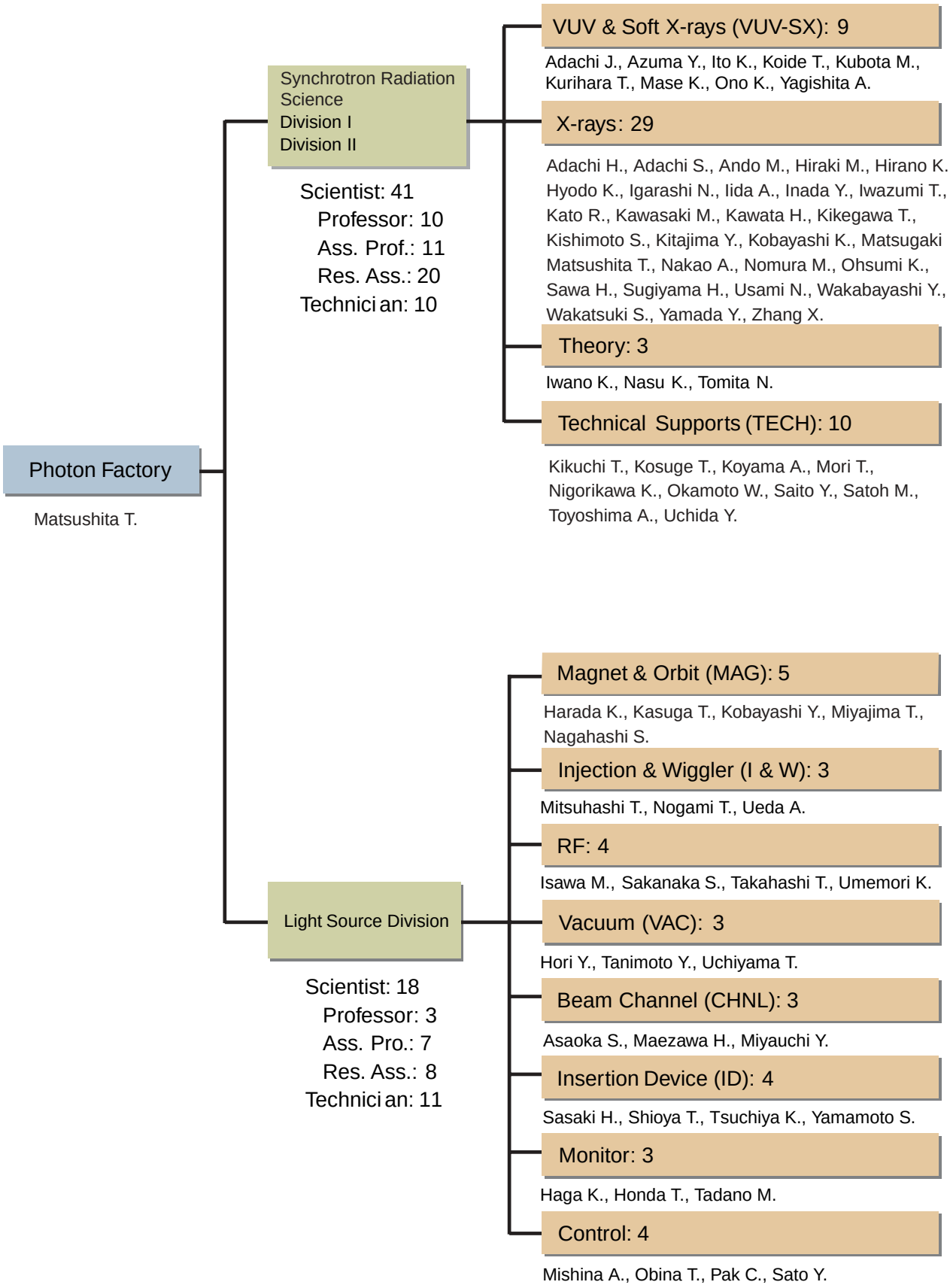


Figure 2
Organizational chart of the Photon Factory, affiliated to the Institute of Materials Structure Science. The number of the PF staff is 80 on February 1, 2006.

Table 2a List of proposals categorized as S1, proposals of excellent quality including the construction of beamlines or experimental apparatus.

	Proposal title	Spokersperson	Station	Period
2003S1-001	New BL construction for research of Strongly Correlated Electron System	KEK-PF H. Sawa		2003/4 - 2006/3
2004S1-001	Construction and utilization of sub-nanosecond resolved diffraction beam lines to search for strongly correlated materials in the non-equilibrium states	Tokyo Inst. of Tech. S. Koshihara	1A NW2 NW14	2004/4 -

Table 2b List of proposals categorized as S2, proposals of excellent quality requiring full use of SR and a large amount of beamtimes.

	Proposal title	Spokersperson	Station	Period
1997S2-001	Photoelectron angular distribution from oriented molecules	KEK-PF K. Ito	2C. 16B, 28A	1997/10-2000/9
1998S2-001	Direct observation of charge- and orbital-ordering in strongly correlated electron system	KEK-PF Y. Murakami	4C 16A2	1998/4-2001/3
1998S2-002	Polarized Raman and photoemission spectroscopy in soft X-ray region	The Univ. of Tokyo S. Shin	2C 16	1998/4-2001/3
1998S2-003	Soft X-ray magnetic circular dichroism study of the electronic and magnetic states of nanometer-scale magnets	KEK-PF T. Koide	28A, NE1B, 11A	1998/10-2001/9
1999S2-001	Accurate characterization of the high pressure and high temperature in situ X-ray diffraction study and the physical property of the lower mantle materials	The Univ. of Tokyo T. Yagi	13B	1999/4-2002/3
1999S2-002	In vivo observation of biological soft tissues with phase-contrast method using a separated-type X-ray interferometer	The Univ. of Tsukuba Y. Itai	14B 14C	1999/4-2002/3
1999S2-003	Development and application of X-ray ellipsometry	The Univ. of Tokyo Y. Amemiya	4A, 15B1, 15C	1999/10-2002/9
2000S2-002	Spin- and orbital-magnetic moment-density distribution of ferromagnets by X-ray magnetic diffraction	Himeji Institute of Tech. M. Itoh	3C3	2000/4 - 2003 /3
2000S2-003	X-ray diffraction studies on structures and properties of interfaces of metal-semiconductors and insulator-semiconductors	The Univ. of Tokyo T.Takahashi	15B2	2000/4 - 2003/3
2001S2-002	Charge, spin, orbital, and lattice ordering of strongly correlated electron system	Tohoku Univ. Y. Murakami		2001/10-2004/9
2001S2-003	Development of soft X-ray energy dispersive surface XAFS and its application to surface chemistry	The Univ. of Tokyo T. Ohta	7A	2001/10-2004/9
2002S2-001	*In vivo* observation of live objects by phase-contrast imaging using separate X-ray interferometer	Univ. of Tsukuba Y. Itai	14C1 14B	2002/4-2005/3
2002S2-002	High-resolution photoelectron spectroscopy of semiconductor/magnetic nanostructures	The Univ. of Tokyo M. Oshima	1C 2C 11A	2002/4-2005/3
2002S2-003	*In-situ* X-ray fluorescence imaging with quick feedback capability	NIMS K. Sakurai	16A1	2002/4-2005/3
2003S2-001	X-ray diffraction studies on structures and controls of semiconductor surfaces and interfaces	Nagoya Univ. K. Akimoto	15B2	2003/4-2006/3
2003S2-002	Target oriented structural genomics of the Protein 3000 Project	KEK-PF S. Wakatsuki	6A, 18B NW12, 5A	2003/4-2006/3
2005S2-001	*In vivo* observation of live objects by phase-contrast imaging using separate X-ray interferometer part III	Univ. of Tsukuba T. Takeda	14C1	2005/4-2008/3
2005S2-002	In situ analysis of semiconductor/magnetic nanosturctures by combinatorial high-resolution photoelectron spectroscopy	The Univ. of Tokyo M. Oshima	1C 2C 28	2005/10-2008/9
2005S2-003	Synchrotron X-ray diffraction study of structural phase transition induced by magnetic field	Tohoku Univ. T. Arima	4C 16A1	2005/10-2008/9

Table 2c List of proposals categorized as U, proposals which are exceedingly important and urgently require beamtime.

	Proposal title	Spokesperson	Station	Beamtime
2001U001	Electronic structure of superconducting magnesium diboride probed by photomission and X-ray absorption spectroscopies	IMSS T. Saitoh	11D 11A	11days
2001U002	Verification of impurity in high-temperature weak ferroamagnetism	Tohoku Univ. H. Aoki	4A	12hours
2001U003	Soft X-ray emission and absorption spetroscopy of novel superconductor MgB_2	Tohoku Univ. N. Miyata	3B 16B	8days
2001U004	Study on partical electronic density of states in supereconducting diborides by soft X-ray absorption and emission spectroscopy	The Univ. of Elec.-Commun. N. Yamada	2C 19B	18days
2001U005	Photoemission study of the room-temperature ferromagnetic semiconductor $ZnGeP_2$ Mn	The Univ. of Tokyo A. Fujimori	18A	11days
2002U001	Structue analysis of CCGI interacting factor A (CIA)	JST/ERATO M. Horikoshi	6A 18B	72hours
2002U002	High resolution structured of trichomaglin, the complexes of methanol dehydrogenase with primary alcohols and of a-amylase with tripeptides	Shanghai Inst. of Organic Chem. Z. Xia	6A	4days
2002U003	X-ray spectroscopic study on photo-induced phase transition of $SrTiO_3$	IMSS T. Iwazumi	9A 7C or 28B	432hours
2003U001	Spin-Polarization of U-6d electrons in ferromagnetic UGe_2	JASRI/SPring-8 Y. Sakurai	28B	168hours
2003U002	XAFS study of local structure for phosphorus doped ZnO thin films	AIST P. J. Fons	11B 2A	12days
2004U001	Structural studies of the multi-subunit RNA polymerase elongation complex	RIKEN V. Dmitry	5	480hours
2004U003	Pressure-temperature diagram for metallic glass zirconium	Zhejiang Univ. J. Jiang	14C2	3days
2004U004	Structure determination of IBV nucleocapsid	School of Bio. Sci. NTU J. Lescar	18B, 5 6A	48hours
2004U005	Crystallographic study of *T.thermophilus* 30S subunit	RIKEN GSC T. Kaminishi	NW12 5	30hours

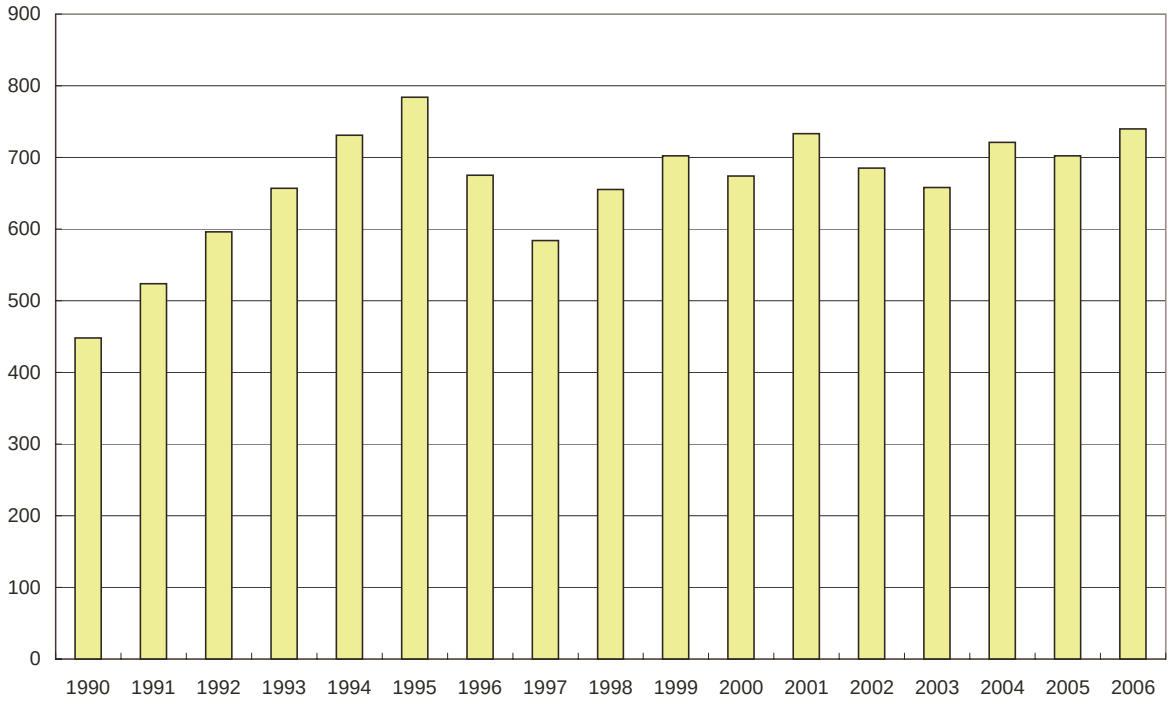


Figure 3
Variation in the number of the active proposals of G and P categories over the period 1990-2006. The number of the proposals stays constantly at 700.

Photon Factory Program Advisory Committee (PF-PAC) and approved by the Advisory Committee for Institute of Materials Structure Science. For all accepted proposals, travel expenses and living allowances are provided for domestic researchers. On-site lodging facilities are available for all the users of the PF.

The S category proposals could receive a privilege; a certain amount of financial support by the PF and priority beam time. This category of proposals is aimed at encouraging project type experiments proposed by experienced power users. When an S1 proposal is approved, the PF will support most or part of the required budget although the spokesperson is encouraged to raise external funds. The group of the S1 proposal is responsible for the construction, commissioning and users experimental support of the relevant beamline or experimental instrument. Tables 2a, b and c show lists of the active S1, S2 and U proposals during 2000-2005. The spokespersons of these proposals are asked to report on their progress by poster presentation every year at PF users meeting. Several members of PF-PAC are asked to write evaluation reports to the PAC after attending these poster presentations.

In Fig. 3 is shown the variation in the number of active proposals for the period 1990-2006. It should be emphasized that the number of the proposals has not decreased in spite of the fact that the SPring-8 became opeprational in 1997.

The number of users who have been registered for experiments at the PF as radiation workers since 1990 is also shown in Fig. 4. The number increases gradually up to 2004, despite the opening of the SPring-8 in 1997, and attains at about 3000. The decrease in 1997 is due to a 9-month shutdown for the high-brilliance project. More than 90% of users are staff of universities and national/public research institutes, and graduate students from universities, and the remaining researchers from private companies, which seems to be decreasing for these several years.

Regional distribution of the spokesperson's affiliation is shown in Fig. 5 for accepted proposals between 1996 and 2005. The proposals are mainly from Japan, and 7% are from overseas. As for the domestic statistics, about 50% of the projects are proposed from the Kanto area (Tokyo area), while the proposals from the Kinki area (Osaka and Kyoto area) are always 20-25% and have not been changed by the commissioning of SPring-8 in 1997.

All the submitted proposals have been reviewed by the PF-PAC. Since 1997, we have five sub-committees as follows;

a) Electronic structure: research concerning the electronic structure of isolated systems and condensed matter.

b) Structural science: research on various materials by means of X-ray diffraction and scattering, for example accurate structure analysis and material characteriza-

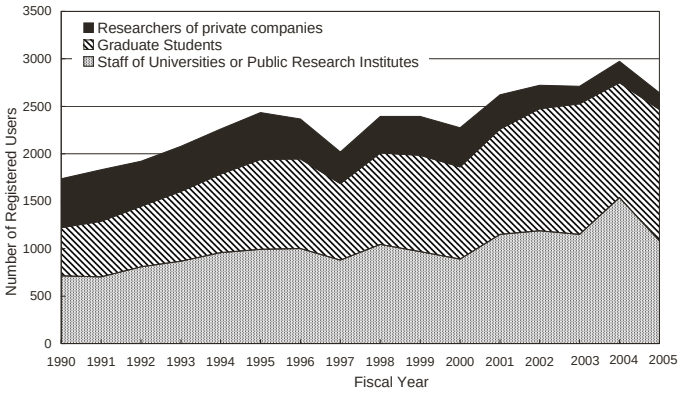


Figure 4
Variation in the number of the registered users of the PF since 1990.

Figure 5
Worldwide regional distribution of spokespersons of the accepted proposals for the period 1996-2005. The users from the Kanto (Tokyo) area is dominant, however, those from the Kinki (Osaka and Kyoto) area is 25% of the total after the commissioning of the SPring-8 in 1997.

tion.

c) Chemistry and new materials: research on chemical condition, material creation, and materials evaluation.

d) Life science I: protein crystallography

e) Life science II: life science other than protein crystallography, such as biological researches by small angle scattering and radiation effect.

In Fig. 6 is shown the variation in proposals accepted by the 5 sub-committees between 1997 and 2005. It should be noted that there are a few proposals doubly counted in the two sub-committees. The number of the proposals associated with protein crystallography is increasing for 2004 and 2005.

The spokesperson of each proposal is requested to report back when he/she publishes papers or reviews which are based on the experiments carried out at the PF. These reports from the sporkespersons allows us to construct the PF publication database; http://wwwdbpf.sr.kek.jp/bunken/. Based on the database, the number of publications amounts to about 500 every year, as shown in Fig. 7, which is higher than that in SPring-8 and is in the world level. The numbers of reported publications for each beamline are shown in Fig. 8 based on the statistics for the periods 1983-1995, 1996-2000 and 2001-2005. The total numbers of the reported publications are 2487 and 2369, respectively, for the periods 1996-2000 and 2001-2005. Outstanding beamlines for this period are BL-7C, BL-9A, BL-10B and BL-12C for XAFS measurements, BL-6A and BL-18B for protein crystallography, and BL-15A and BL-10C for X-ray diffraction at small angle scattering. In

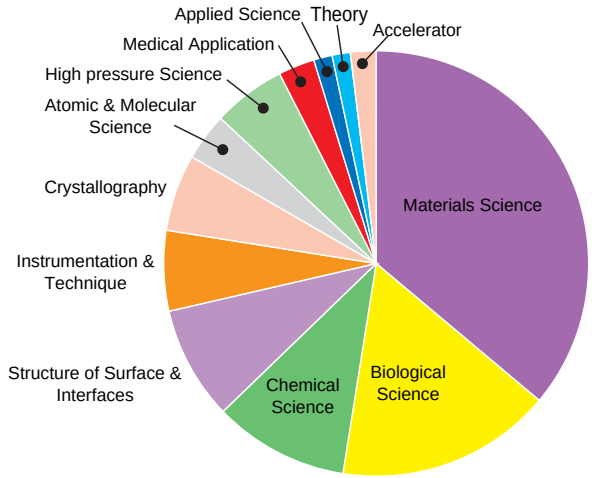


Figure 9
Publication presented in academic journals, classified by scientific fields for the period 1996-2005.

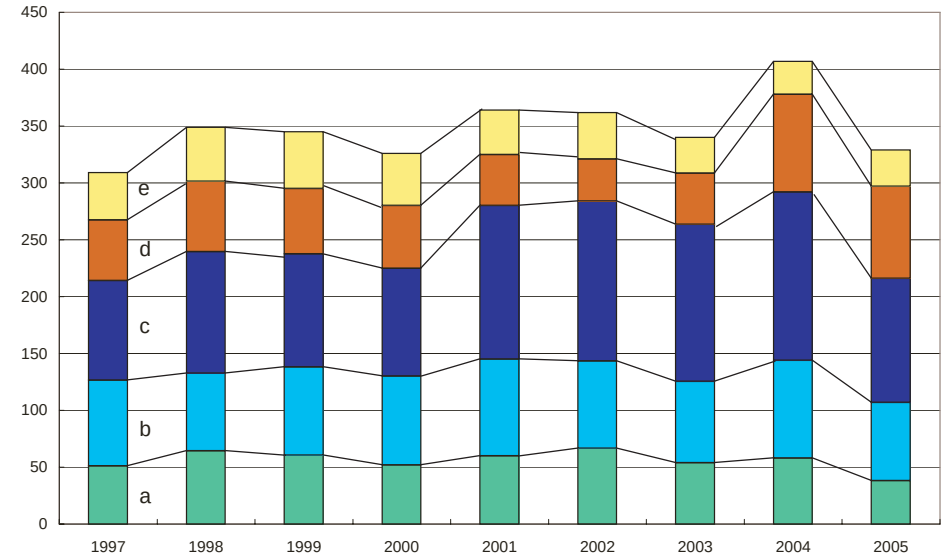


Figure 6
Variation in accepted proposals classified by the five sub-committees of the PF-PAC for the period 1997-2005; (a) electronic structure, (b) structural science, (c) chemistry and new materials, (d) life science I and (e) life science II. The proposal number of the life science I, protein crystallography, is abruptly increasing since 2004.

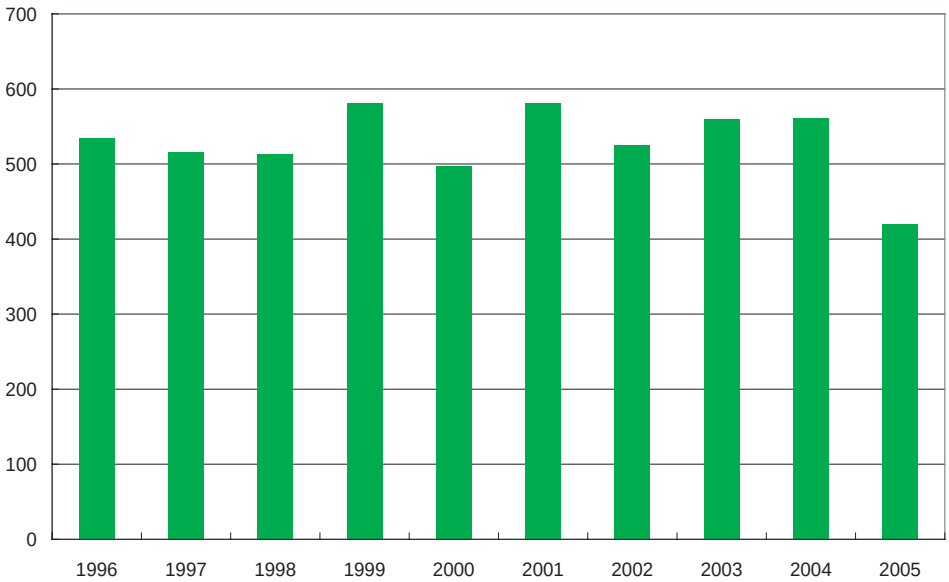


Figure 7
Number of the reported publications associated with the PF activities for the period 1996-2005.

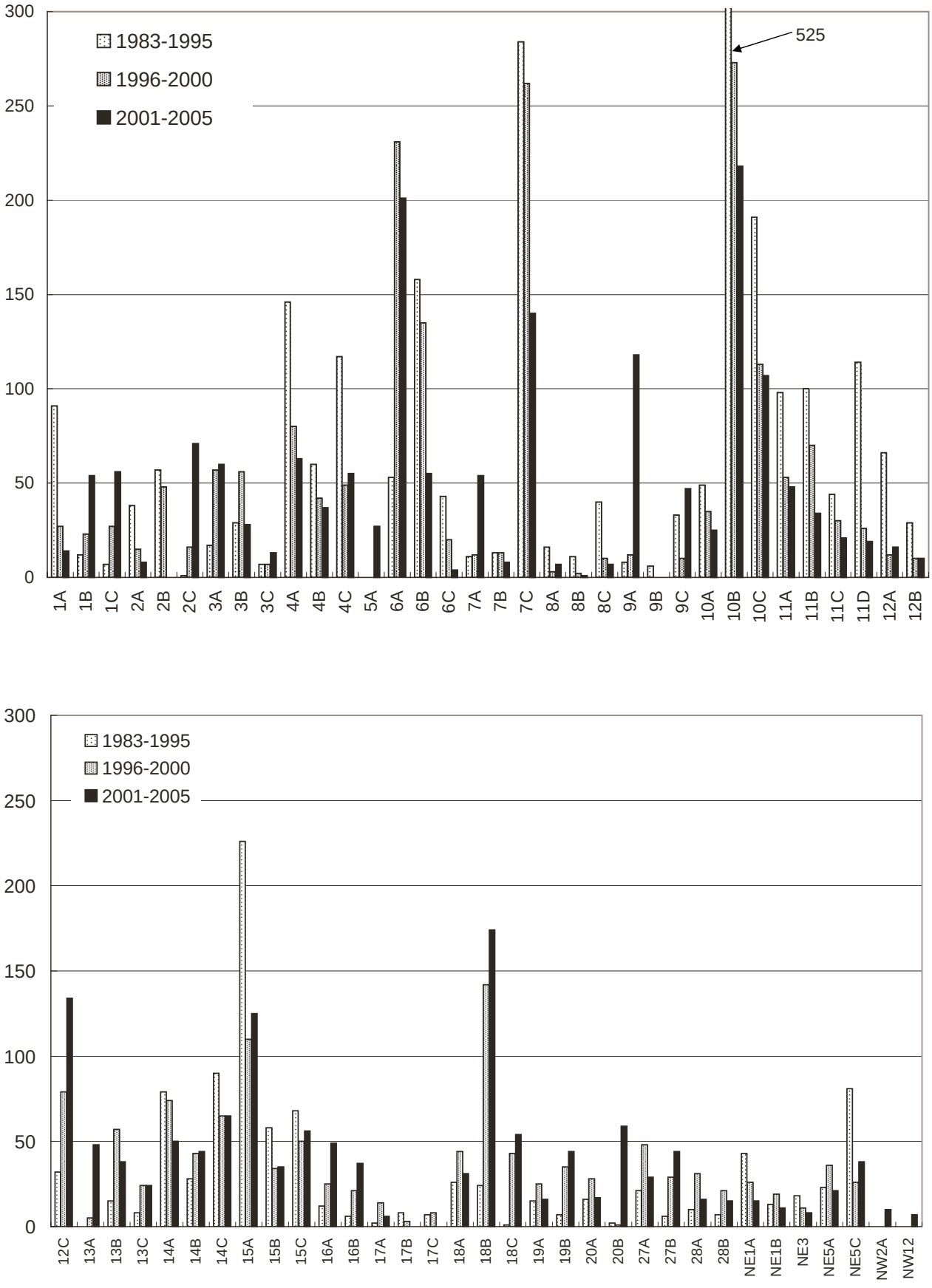


Figure 8
Number of the reported publications by branch beamlines for the periods 1983-1995, 1996-2000 and 2001-2005.

case of XAFS and protein crystallography, the measurements for a series of samples are carried out at more than one experimental station. Publications associated with such measurements may often be counted at plural beamlines. The number of publications form newly constructed structural biology beamlines, BL-5 and NW-12, is increasing rapidly, as is not indiscernible in Fig. 8. In Fig. 9 is shown the percentage of publications reported for the period 1996-2005 grouped by scientific field. Materials science and chemical science are mostly attributed to XAFS studies.

We have a system in which we can financially support workshops organized by the PF staff and users. On average, 4 workshops are supported and organized every year. Such meetings give an opportunity for the users and PF staff to find out future prospect in their scientific fields with synchrotron radiation and to encourage developing new instrumentations. The PF Workshops held between 1997 and 2005 are listed in Table 3.

2.3 In-House Staff Members' Research Activities

The PF recognizes that improvement of in-house staff members' research environment is one of the important issues for the vivid and high-level scientific activities of the laboratory. For this purpose, various measures were taken as follows.

In the early stage of the PF history, we had to hire scientists with a very wide range of scientific backgrounds to cover a wide spectrum of users' scientific fields. Staff scientists had tendencies to conduct their own research individually and in collaboration with outside users, because they cannot find in-house scientists who have similar research interests and backgrounds. In the early 1990s, we have changed our policy and started our effort to form active research groups inside the PF of a certain critical size to perform good collaborative research within the group. This was only realized by assigning positions to groups when we have new vacancies or new positions available. The definition of critical size depends on the scientific field. We tried to form groups, consisting of more than 3 in-house staff members with at least two permanent staff members. Among these research groups, we have a special emphasis on the formation of structural biology group, directed by Prof. Soichi Wakatsuki. This in-house group was formed in 1998 for promoting biology and biophysics research activities including construction of protein crystallography beamlines and support of users. This group is now consists of 7 permanents and 28 temporary contractors.

In principle, staff scientists are requested to submit regular proposals to get their own beam time. This is to keep the transparency of the beam time assignment and to keep a scientific level of the staff members. However, such regulation makes the position of staff, postdoctoral fellows and graduate students less attractive, and hinders the quick development of new technology. In this situation, we adopted the staff priority beam time in 1997, whichi can be used for training graduate students and for doing some initial trials or feasibility studies of new experimental apparatus. In-house staff can request staff priority beam time to the Heads of the Synchrotron Radiation Science Divisions. The total length of such staff priority beam time on each beamline is limited to 20% of all available beam time. Fig. 10 shows staff priority beam time assigned during 1997-2005, which amounts to at most 5% of the total beamtime. All the IMSS staff can apply to the staff priority beam time in order to encourage research collaboration among the staff members of the PF, Neutron Laboratory and Muon Laboratory. Furthermore, we started another system, preserved beamtime, in 2004. The beamline masters can reserve up to about 10% of beam time, in order to make compensate for lost beam time due to hardware troubles, to realize prompt upgrade of beamlines and experimental apparatuses, to carry out proposals of U category without delay, and to give a short course to new users, and to manage beamlines flexibly.

We encourage user groups to have a strong commitment to the operation and maintenance of beamlines, which were originally constructed by the PF. This system started in 1997, and there are 5 user groups at BL-4B2, BL-10C, BL-13C, BL-15A and AR-NE5C, who take care of their own beamlines, and can submit proposals for priority beamtime in a similar way to in-house staff. We think that this arrangement may reduce the load on in-house staff, when he/she does not use the relevant beamline for his/her own research.

The PF has 11 technicians in the Light Source Division and 10 in the Synchrotron Radiation Science Divisions I and II. The total number of technicians is too small to support the operation of the PF. To enhance our technical staff, we have a contract with Mitsubishi Electric System Service Co. Ltd. providing 5 technicians for the Light Source Division, and 8 technicians for the Synchrotron Radiation Science Divisions I and II. Such support has been effective in reducing the load on in-house staff scientists. From autumn of 2000, we have added 2 more Mitsubishi technical staff who support the design, construction and commissioning of beamlines. These staff members are included in the construction group of new beamlines and are being trained in their everyday task.

We hire several part-time secretaries who take care of publishing PF News and PF Activity Reports, and the PF official web site, and assists in the clerical work associated with supporting users, especially foreign scientists. This might reduce the load of the PF staff members.

It is difficult to measure the research activities of the in-house staff members. The numbers of proposals submitted by the PF staff members are shown in Fig. 11, and the numbers of publications reported by the PF staff members are listed in Table 4. Apparently, the effort to improve the environment of the in-house staff to

Table 3 List of the Photon Factory Workshops approved by the PF-PAC since 2000.

No.	Title	Proposer	Manager	Participant	Date
WS2000-1	New Prospect of Structural Science byX-ray and Neutron Diffraction/Scattering	K. Wakabayashi (Osaka Univ.), Y. Amemiya (The Univ. of Tokyo)	H. Kamikubo	30	2000, Dec. 19,20
WS2000-2	Low dimensional properties revealed by high resolution electron spectroscopy	M. Oshima (The Univ. of Tokyo)	A .Kakizaki	30	2000, May 9,10
WS2000-3	Frontier of XAFS spectroscopy for 21 century	K. Asakura (Hokkaido Univ.)	M. Nomura	50	2000, Apr. 1,2
WS2000-4	New Prospects of Surface Chemistry with Advanced Soft X-ray Light Source: From Static Surfaces towards Dynamical Surfaces and Interfaces	T. Yokoyama (The Univ. of Tokyo), A. Yoshinobu (The Univ. of Tokyo), Y. Ohuchi (Nagoya Univ.), K. Mase (IMSS)	K. Mase	60	2001, Mar. 22,23
WS2001-1	Symposium of Powder Diffraction Methods: Recent Development in Methodology	H. Toraya (Nagoya Inst. of Tech.)	M. Tanaka	80	2001, May 10, 11
WS2001-2	Structural Analysis of Thin Films and Multiplayer Films using X-ray Reflection/Scattering Method	K. Sakurai (NIMS)	K. Hirano	30	2001, Dec. 21,22
WS2001-3	Workshop on the Development of Microbeam Cell Irradiation System	K. Kobayashi (IMSS)	K. Kobayashi	30	2002, Mar. 7,8
WS2001-4	Materials Science using Inelastic X-ray Scattering	N. Sakai (Himeji Inst. Of Tech.)	T. Iwazumi	60	2002, Mar. 29,30
WS2002-1	Forefront of Atomic and Molecular Science and Solid State Physics using SR in the VUV Region	K. Ito (IMSS)	T. Saitoh	30	2002, May 1
WS2002-2	Development of a Femto-Second Pulse Synchrotron Light Source and Prospects of New Science (first workshop of PF Future Plan)	K. Mase (IMSS)	K. Mase		2002, Oct. 3,4
WS2002-3	Recent Development in X-ray Measurement using Phase Information (second workshop of PF Future Plan)	A. Momose(The Univ. of Tokyo)	K. Hirano	50	2002, Oct. 31, Nov. 1
WS2002-4	Prospect of Synchrotron Micro-beam and its Applications (third workshop of PF Future Plan)	A. Iida (IMSS)	A. Iida		2002, Nov. 14,15
WS2002-5	Progress and Future Prospects of Core-Level Spectroscopy	T. Miyahara (Tokyo Metro Univ.), A. Fujimori (The Univ. of Tokyo) K. Nasu, T. Koide, T. Iwazumi (IMSS)	T. Koide, T.Iwazumi	50	2002, Dec. 20,21
WS2003-1	Recent Status and Future Prospects of SAXS Studies at the Photon Factory	K. Wakabayashi, Y. Inoko (Osaka Univ.), H. Takahashi (Gunma Univ.)	M. Nomura	50	2003, Dec. 23,24
WS2003-2	Nanotechnology and High Resolution Electron Spectorscopy	M. Oshima (The Univ. of Tokyo)	K. Ono		2003, Dec. 19,20
WS2003-3	Future Prospects of Science and Technology in the Soft X-ray Region with Crystal Monochromators at the Photon Factory	K. Asakura (Hokkaido Univ.), H. Kondoh (The Univ. of Tokyo), H. Shimada (AIST), T. Iwazumi (IMSS)	T. Iwazumi, Y. Kitajima	100	2003, Mar. 23
WS2003-4	Development of Nuclear Resonant Scattering Research using Synchrotron Radiation	M. Seto (Kyoto Univ.)	S. Kishimoto, X. Zhang		2003, Oct. 7
WS2003-5	Progress of Studies on the Structure and Electronic States of Materials in Photo-excited States	H. Kawata (IMSS)	S. Adachi		2004, Mar. 5
WS2004-1	Workshop on Biological Effects of Low Dose Radiation using Microbeam Cell Irradiation System	K. Kobayashi, N. Usami (IMSS)	K. Kobayashi, N. Usami	30	2004, Dec.20,21
WS2004-2	The 3rd Symposium on Powder Diffraction Method; New Aspects Achieved by Powder Method	T. Ida (Nagoya Inst. of Tech.)	M. Tanaka	100	2004, Dec. 1,2
WS2004-3	Possibilities of Dynamic Structure Analysis using a Hard X-ray	K. Asakura (Hokkaido Univ.), E. Matsubara (Tohoku Univ.)	M. Nomura	50	2004, Dec.24,25
WS2004-4	X-ray and Neutron Reflectometry: Towards Nanoscience and Technologies	K. Sakurai (NIMS)	K. Hirano	50	2004, Jul. 20,21
WS2005-1	Prospect in Condensed Matter Research using Undulator Synchrotron Radiation	A. Fujimori (The Univ. of Tokyo)	K. Ono	50	2004, Apr. 12,13
WS2005-2	Recent Development in X-ray Measurement using Phase Information II	A. Momose(The Univ. of Tokyo)	K. Hirano	60	2004, May 12, 13
WS2005-3	Recent and Future Developments in Structural Material Science used by Synchrotron Radiation Scattering	Y. Murakami, T. Arima (Tohoku Univ.) H. Sawa (IMSS)	H. Sawa		2004, Sep. 8,9

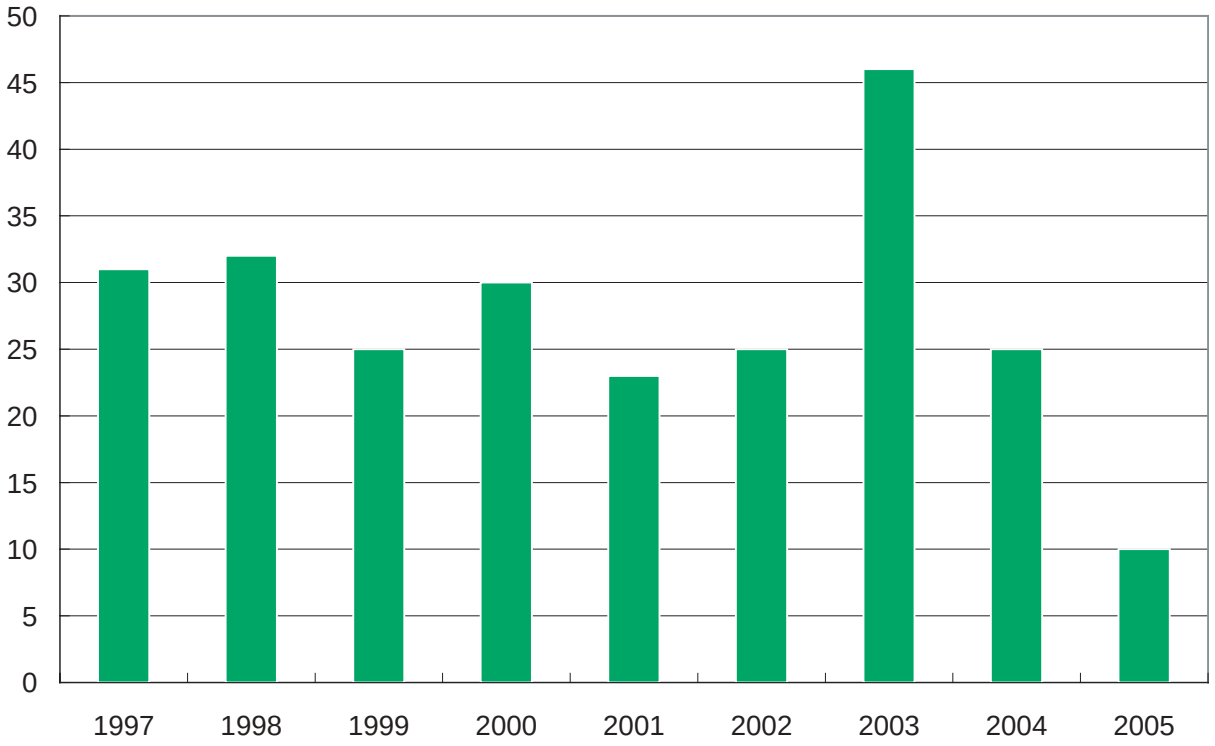


Figure 10
Variation in the number of proposals for the PF staff priority beam time for the period 1997-2005.

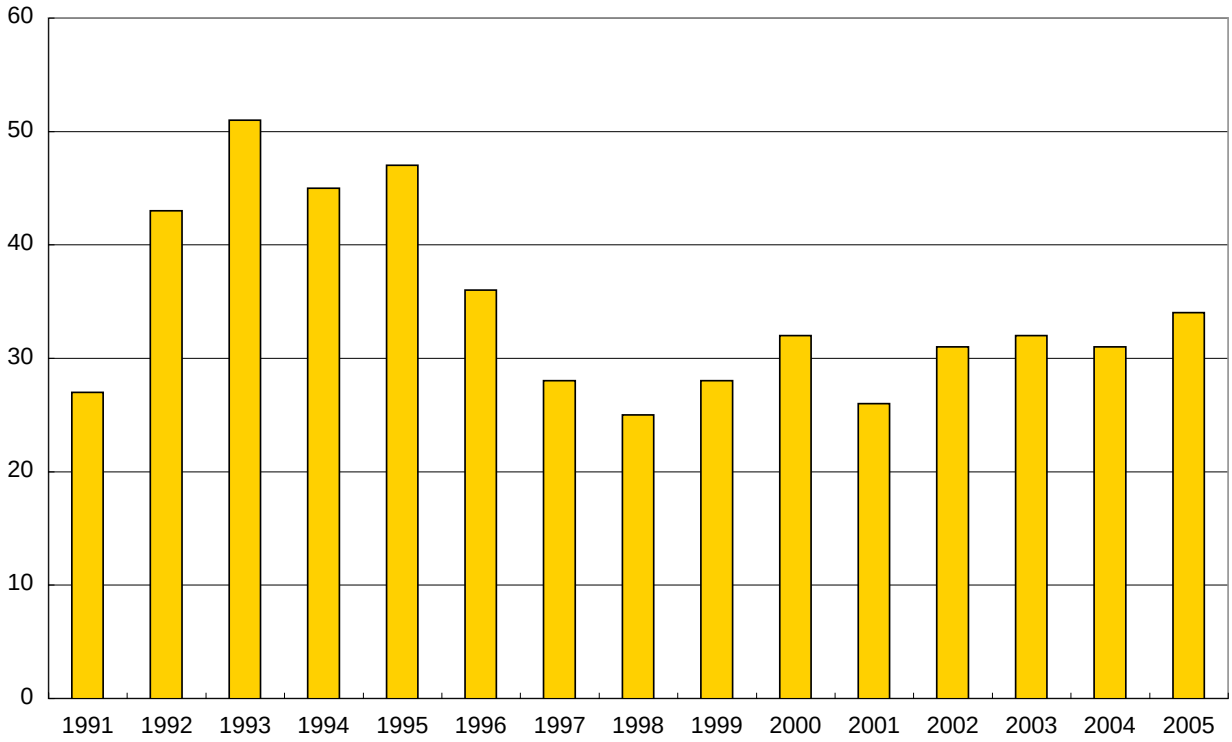


Figure 11
Active experimental proposals, of which spokespersons are the PF staff members, for the period 1990-2005.

Table 4 Variation in the number of publications presented by the PF staff in the Syncrotron Radiation Science Divisions for the period 1990-2005.

	in English			in Japanese	Total
	original	proceedings	others		
1990	91	39	4	24	158
1991	74	32	7	24	137
1992	111	60	22	26	219
1993	80	32	30	16	158
1994	95	44	5	28	172
1995	120	44	21	25	210
1996	105	38	18	27	188
1997	103	26	2	16	147
1998	108	24	3	13	148
1999	94	29	3	7	133
2000	87	20	4	11	122
2001	88	34	3	7	132
2002	59	9	2	13	83
2003	80	22	9	14	125
2004	87	29	5	19	140
2005	55	11	1	7	74
Total	1,437	493	139	277	2,346

encourage their research activities is not reflected in the two data. A precise investigation on this matter is necessary.

2.4 International Collaboration

The PF has had various collaborative programs with the oversea synchrotron radiation facilities.

The collaboration with the Australian Synchrotron Facility is based on the existence of the Australian National Beamline Facility constructed at BL-20B of the 2.5-GeV Ring in 1993 to perform X-ray diffraction and absorption experiments. This beamline accepts about 50 proposals every year and 120-130 Australian scientists visit every year to carry out experiments.

We believe that the collaboration with the Asian society of synchrotron radiation is very important. We started collaboration with Asian countries by inviting a few researchers from the Beijing Synchrotron Radiation Facility as visiting scientists of the MEXT before 2000. In 2000, a new exchange program between Japan and China was started as a Core University Program supported by the Japan Society for the Promotion of Science (JSPS). We have accepted 92 researchers from the Beijing Synchrotron Radiation Facility, the Shanghai Synchrotron Radiation Facility and the National Synchrotron Radiation Center at Hehei, and 48 Japanese researchers of the PF and the other institutions outside KEK have been to China so far. We think that this exchange program makes an important role for improvement of existing facilities and construction of new facilities each other. In 2005, the India and the South Korea are involved in this collaboration program.

The agreement of academic exchange between Administration Board of the National Synchrotron Research Project (Thailand) and KEK was established in 2000. Mutual exchange of several researchers has been done for a few years.

A JSPS Asian Seminar was organized on Oct, 2002 at Al-Balqa' by JSPS, Al-Balqa' Applied University and KEK. The purpose was to give potential users of "Synchrotron-light for Experimental Science and Applications in the Middle East" (SESAME) an overview of the project and an introduction to synchrotron radiation science.

The PF and the Stanford Synchrotron Radiation Laboratory (SSRL) agreed to collaborate in areas of mutual interest, An annex of the signed Memorandum of Understanding (MOU) in 2003 provided the opportunity for the PF and SSRL users to receive beamtime at either facility during the shutdown of one or the other facility for a major upgrade.

2.5 Commitment to the Education of Graduate Students

There are two ways for the PF staff member to have graduate students in his/her group. One is to have students in the Department of Materials Structure Science of the Graduate University for Advanced Studies (GUAS). The other is to have Joint Ph.D. (JPHD) students who are accepted by the PF to pursue advanced studies under the supervision of the PF staff toward their Ph.D. degrees from their home institutes. Table 5 shows the number of students we have had during 1990-2005.

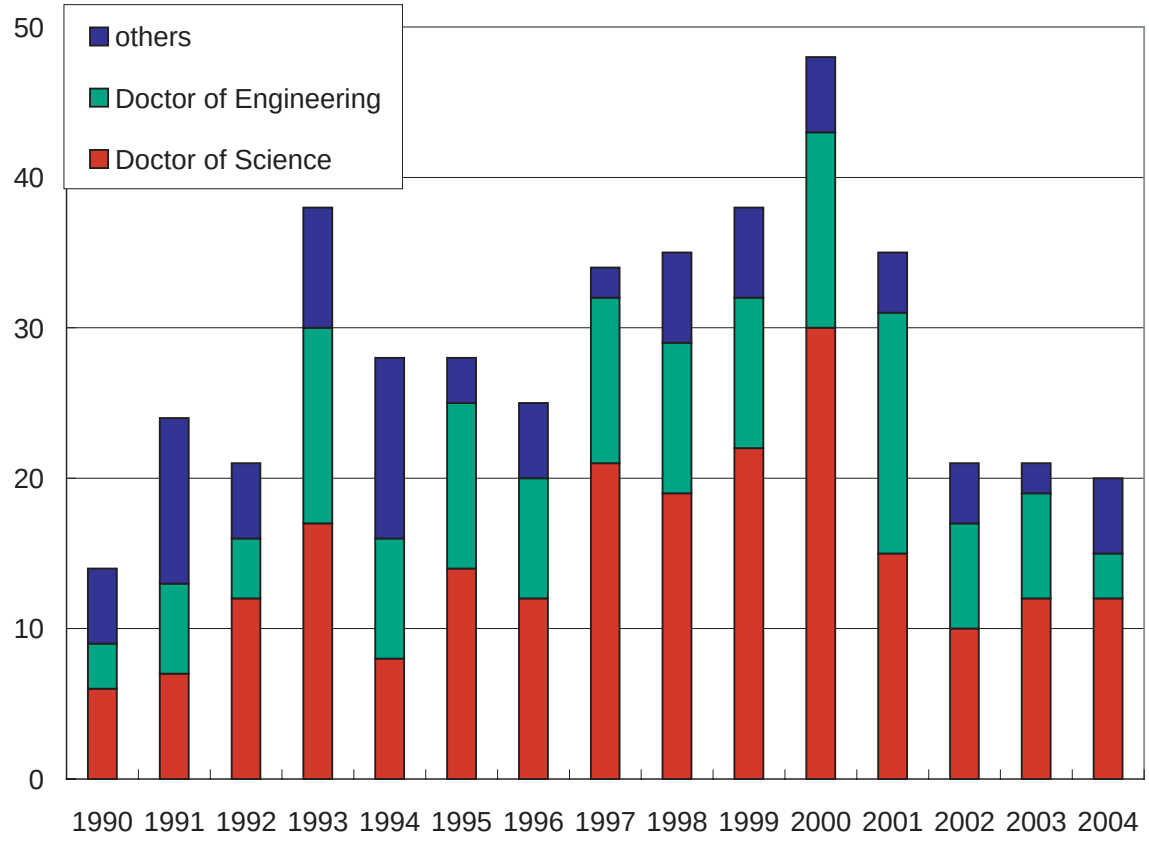
A number of Doctoral and Master theses have been written based on experiments performed at the PF. Fig. 12 shows the numbers of graduate students who obtained the masters and doctoral degrees based on experiments carried out at the PF. Since the database for the registration of the academic degrees started in November, 2005, Fig. 12 is still imperfect. It is sure that there are more graduate students who have acquired their academic degrees, and we continue our effort to collect the data reflecting the reality.

As mentioned previously, staff priority beam time can be used for training and some preparatory experiments of students supervised by the PF staff members. Such arrangement has been effective and useful for educating students at the PF.

Table 5 Number of the Joint Ph.D. students (JPHD) and the students of the Graduate University for Advanced Studies (GUAS) since 1990.

YEAR	JPHD	GUAS*
1990	2	3
1991	3	6
1992	5	4
1993	9	6
1994	6	4
1995	6	4
1996	4	4
1997	4	2
1998	11	3
1999	5	1
2000	5	4
2001	8	4
2002	7	5
2003	8	5
2004	5	4

* number of students entered per year



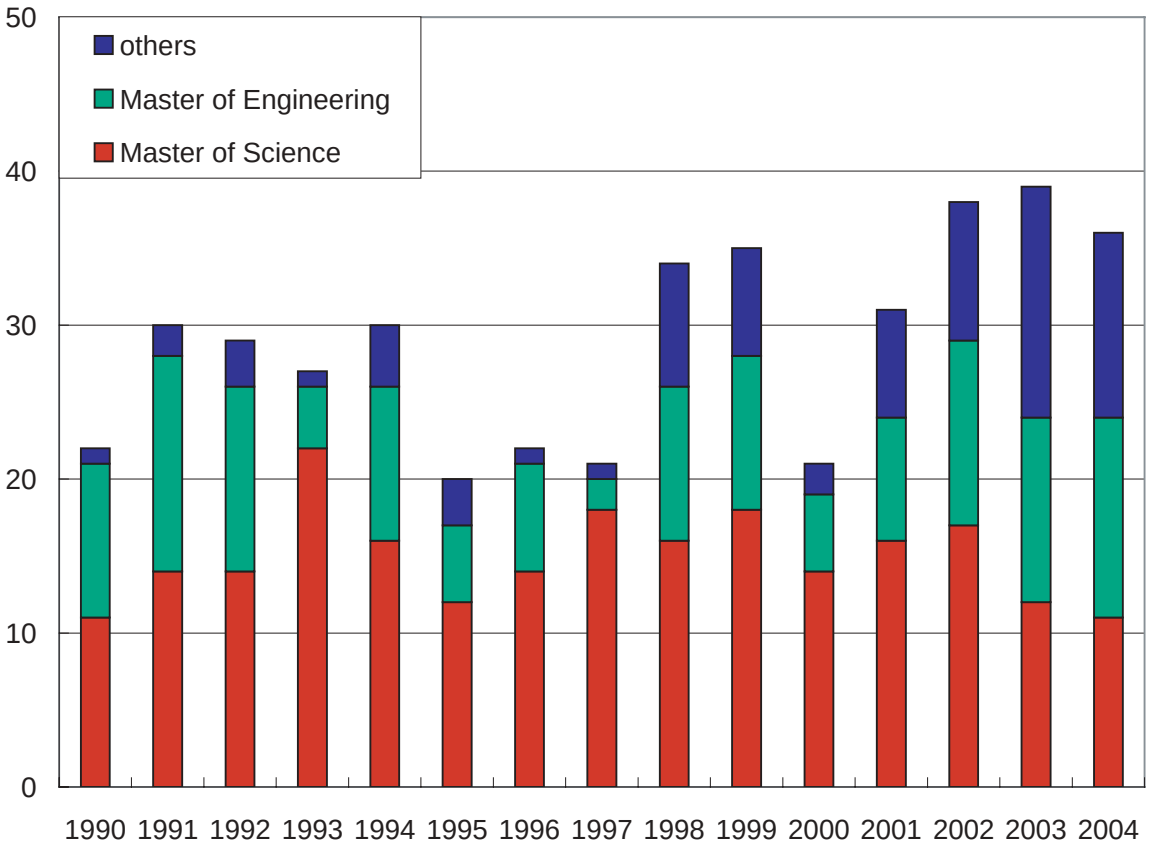


Figure12
Number of the graduate students who obtained the masters and doctoral degrees with the experiments carried out at the PF for the period 1990-2004.