SPring-8

I. Introduction

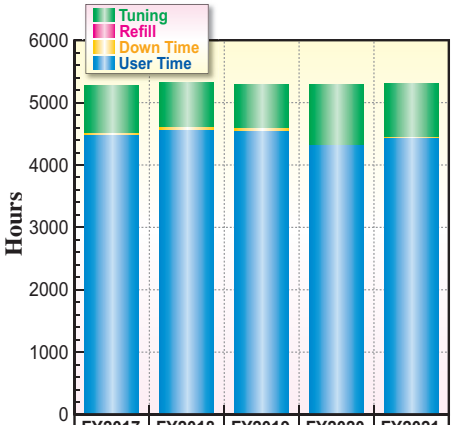
SPring-8 was stably operated throughout FY2021 with the total operation time of the accelerator complex and the total user beam time of 5300.2 h and 4426.9 h, respectively, and a total downtime of 10.0 h. SPring-8 had to complete all its operations by the middle of February 2022.

Three interim reviews were conducted for contract beamlines SUNBEAM ID (BL16XU, SUNBEAM Consortium), SUNBEAM BM (BL16B2, SUNBEAM Consortium), Macromolecular Assemblies (BL44XU, Institute for Protein Research, Osaka University) and TOYOTA (BL33XU, TOYOTA Central R&D Labs., Inc.), and the projects were authorized to continue. Because of contract cancellation, the postevaluation of WEBRAM (BL15XU, National Institute for Materials Sciences) was conducted. At present, the number of SPring-8 users is as high as 12,000, all of whom are members of the SPring-8 User Community (SPRUC).

It is important for SPring-8 to jointly organize scientific events with SPRUC, such as the SPring-8 Symposium, to facilitate dialogue between users and the facility staff. In 2021, the SPring-8 Symposium was held online on September 17 and 18 owing to COVID-19, with 480 participants. SPring-8 also facilitates communication between users and industry. The Joint Conference on Industrial Applications of SPring-8 was held in Hyogo Prefecture on September 1 and 2, 2021, with 295 participants (126 were online participants). As part of its continuous effort towards fostering human resources in synchrotron sciences, SPring-8 organized the 21st SPring-8 Summer School with 74 students of graduate schools nationwide, in cooperation with University of Hyogo, Kwansei Gakuin University, The University of Tokyo, Okayama University, Osaka University, Ibaraki University, Japan Atomic Energy Agency, National Institutes for Quantum and Science and Technology, and RIKEN. Furthermore, SPring-8 and SPRUC organized the 5th SPring-8 Autumn School with 59 participants, which included university students and corporate researchers.

II. Machine Operation

The operation statistics for the last five fiscal years are shown in Fig. 1. The linear accelerator of the X-ray Free-Electron Laser (XFEL) facility, SACLA, has been used as a full-time injector for the SPring-8 storage ring since 2020. In FY2021, all the user time was taken up by beam accumulation and topping-up by beam injecting from the SACLA linac. The operation time of the storage ring was 5300.2 h, 83.5% of which (4426.9 h) was devoted to the SR experiments. This excellent figure for the user time represents a storage ring availability of 99.7%. The total downtime caused by failures amounted to 10.0 h, accounting for 0.22% of the total user time. For 99.6% of the user time in FY2021, the stored beam current stayed at 100 mA by the top-up operation wherein the stored beam was filled up on demand at any time. Extreme stability of the light source intensity of better than 0.1% was achieved by the top-up operation.



	FY2017	FY2018	FY2019	FY2020	FY2021
Accelerator Operation Time	5281.6	5329.8	5285.7	5284.6	5300.2
Storage Ring Operation Time	5270.4	5316.7	5271.2	5274.8	5300.2
Tuning & Study (Acc. & BL)	769.6	721.8	701.7	964.6	860.2
Refill	4.6	5.3	5.6	3.6	3.1
Down Time	28.7	43.1	40.5	7.4	10.0
Mean Time Between Failures	194.7	168.9	206.3	718.2	553.4
Achieved User Time	4478.7	4559.6	4537.9	4309.0	4426.9
Planned User Time	4512.0	4608.0	4584.0	4464.0	4440.0
Availability (%)	99.3	98.9	99.0	99.7	99.7

Fig. 1. Operation statistics for five most recent fiscal years.

Table 1. Operation modes in FY2021

	Single bunch current (mA)	Share of operation time (%)
203 bunches		41.1
4 bunch-train × 84		3.2
11 bunch-train × 29		30.8
1/7-filling + 5 single bunches	3	8.1
2/29-filling + 26 single bunches	1.4	0
1/14-filling + 12 single bunches	1.6	3.2
4/58-filling + 53 single bunches	1.0	0
406 × 11/29-filling + 1 single bunch	5	13.5

The variety of operation modes for the SR experiments is one of the characteristics of SPring-8. The operation modes are classified into two types, the several-bunch and hybrid-filling modes. The several-bunch mode consists of equally spaced bunches or trains of bunches such as 203 bunches or 29 trains of 11 bunches. The hybrid-filling mode is composed of a long train of bunches and isolated single bunches. The operation modes of SPring-8 are listed in Table 1 with the share of each operation mode in FY2021. In the operation with beam injection from the SACLA linac, the spurious bunch sweeping system in the SACLA linac and the bunch cleaning system in the storage ring are activated to maintain a sufficient isolated bunch purity. Table 2 summarizes the beam parameters of the storage ring.

Table 2. Beam parameters of SPring-8 storage ring

Energy [GeV]	8
Number of buckets	2436
Tunes (ν_x / ν_y)	41.14 / 19.325
Current [mA]:	
single bunch	12
multi bunch	100
Bunch length (σ) [psec]	13
Horizontal emittance [nm·rad]	2.4 *
Vertical emittance [pm·rad]	4.8 *
Coupling [%]	0.2
RF Voltage [MV]	14.4 ** ~ 16
Momentum acceptance [%]	3.2 (~256 MeV)
Beam size (σ_x / σ_y)* [μm]	
Long ID section	333 / 7
ID section	316 / 5
BM1 section	94 / 12
BM2 section	100 / 12
Beam divergence ($\sigma_{x'}$ / $\sigma_{y'}$)* [μrad]	
Long ID section	8 / 0.7
ID section	9 / 1.0
BM1 section	58 / 0.5
BM2 section	68 / 0.5
Operational chromaticities (ξ_x / ξ_y)	+2 / +2 ***
Lifetime [hr]:	
100 mA (multi bunch)	~250
1 mA (single bunch)	~30
Horizontal dispersion [m]:	
Long ID section	0.153
ID section	0.146
BM1 section	0.039
BM2 section	0.059
Fast orbit stability (0.1 – 200 Hz) [μm]:	
horizontal (rms)	~4
vertical (rms)	~1

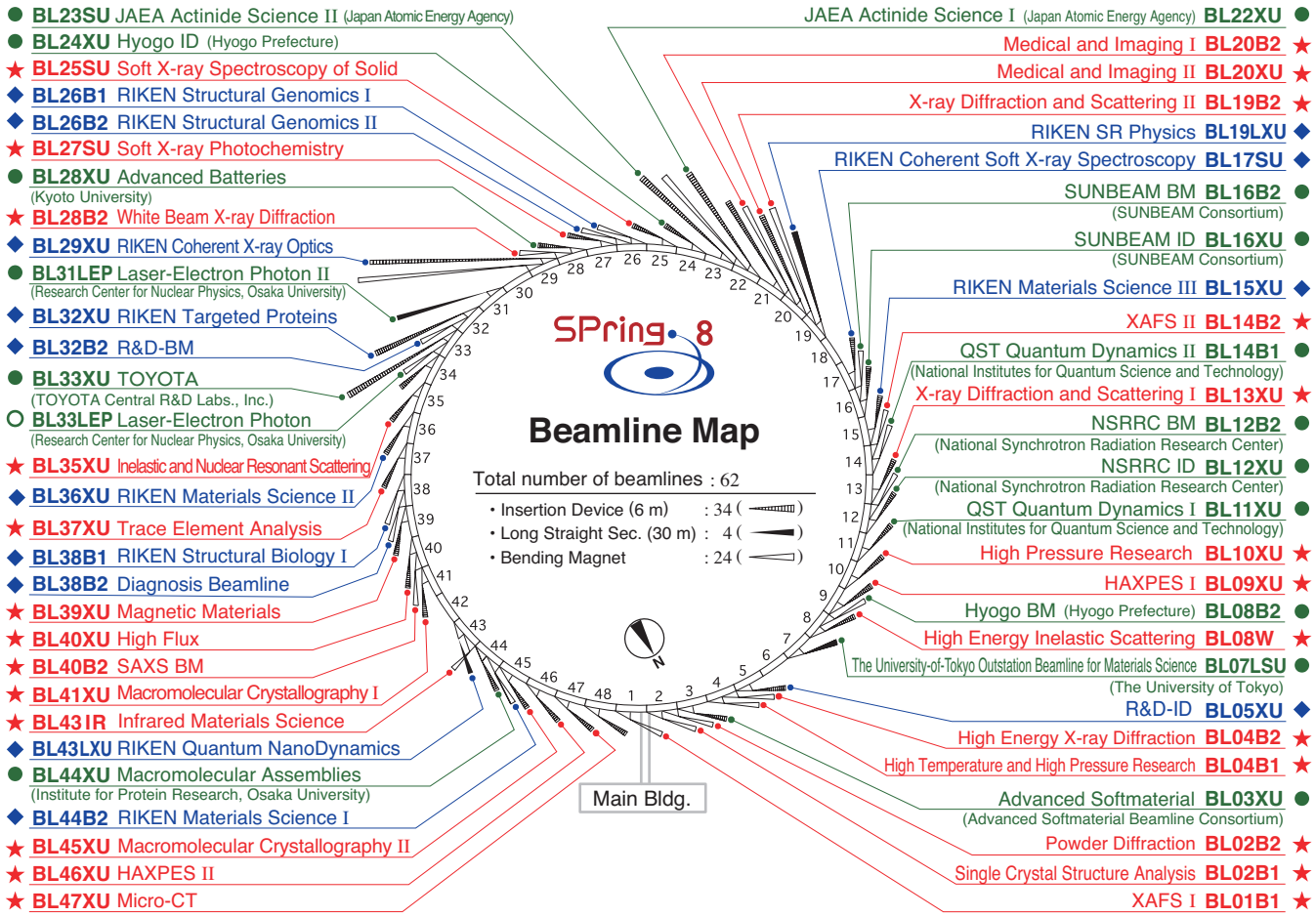
* Assuming 0.2% coupling
** Power saving mode
*** With bunch-by-bunch feedback

III. Beamlines

The SPring-8 storage ring can accommodate up to 62 beamlines: 34 insertion devices, 4 long undulators, and 24 bending magnets. At present, 57 beamlines are in operation, covering a wide variety of research fields involving synchrotron radiation science and technology. The beamlines are classified into the following three types.

(1) Public Beamlines (26 beamlines operating),
(2) Contract Beamlines (17 beamlines operating), and
(3) RIKEN Beamlines (14 beamlines operating).

There are now 26 public beamlines in full operation. The beamlines that have been proposed and constructed by external organizations, such as universities, research institutes, private companies and consortiums, are called contract beamlines, which are used exclusively by the contractors for their own research purposes. At present, 17 contract beamlines are in operation. The beamlines constructed by RIKEN or transferred to RIKEN, except for public beamlines, are called RIKEN beamlines, which are mainly used for RIKEN's own research activities, with partial availability for public use. RIKEN is now operating 14 beamlines. To illustrate the beamline portfolio of SPring-8, a beamline map is shown in Fig. 2 together with the beamline classification. The research fields of each beamline are presented in Table 3.



BL: Beamline
B1, B2: Bending Magnets
XU: X-ray Undulator
SU: Soft X-ray Undulator
W: Wiggler

IR: Infrared Radiation
LEP: Laser-Electron Photon
LXU: Long-length X-ray Undulator
LSU: Long-length Soft X-ray Undulator

NSRRC: National Synchrotron Radiation Research Center, Taiwan

★ : Public Beamlines
● : Contract Beamlines
◆ : RIKEN Beamlines

○ : Under removal work

Fig. 2. Beamline map.

Table 3. List of beamlines

BL #	Beamline Name	(Public Use) or (First Beam)	Areas of Research and Available Techniques
★ Public Beamlines as of April 2022			
BL01B1	XAFS	(Oct. 1997)	Wide energy range (3.8–113 keV), XAFS of dilute systems and thin films, time-resolved XAFS by quick scan (time-resolved QXAFS), depth-resolved XAFS. XAFS at low and high temperatures. Simultaneous XAFS and XRD measurements. Simultaneous XAFS and IR measurements.
BL02B1	Single Crystal Structure Analysis	(Oct. 1997)	Charge density study using high energy X-ray. *In situ* single crystal experiments. Microcrystal structure analysis.
BL02B2	Powder Diffraction	(Sept. 1999)	Charge density study from powder diffraction. Structural phase transition. *Ab initio* structure determination from powder diffraction. Crystal structure refinement by Rietveld method. *In situ* powder diffraction experiment under gas and vapor adsorption/desorption.
BL04B1	High Temperature and High Pressure Research	(Oct. 1997)	X-ray diffraction measurements and radiography under extreme conditions using large-volume press.
BL04B2	High Energy X-ray Diffraction	(Sept. 1999)	Structural analysis of glass, liquid, and amorphous materials.
BL08W	High Energy Inelastic Scattering	(Oct. 1997)	Magnetic Compton scattering. High-resolution Compton scattering. Compton scattering imaging. High-energy X-ray scattering. High-energy X-ray fluorescence analysis (XRF). Time-resolved pair distribution function analysis (PDF).
BL09XU	HAXPES	(Oct. 1997)	Resonant hard X-ray photoelectron spectroscopy (HAXPES). Polarization-dependent HAXPES using diamond phase retarder. Depth analysis of electron state. Materials science and applied materials science.
BL10XU	High Pressure Research	(Oct. 1997)	Crystal structure analysis under high pressure using diamond-anvil cells, *in situ* /*operando* observation of phase transition and compression behavior under extreme conditions. Material sciences under extreme conditions. High pressure Earth and Planetary science.
BL13XU	Surface and Interface Structures	(Sept. 2001)	X-ray diffraction and reflectivity measurements. Atomic-scale structural analysis of crystal surfaces and interfaces, ultrathin films, and nanostructures. Residual stress measurement. Time-resolved X-ray diffraction. *In situ* process observation using X-ray diffraction. *Operando* X-ray diffraction. High-resolution powder X-ray diffraction and X-ray total scattering. Structural refinement using Rietveld analysis. *In situ* /*operando* powder X-ray diffraction. Time-resolved powder X-ray diffraction. Analysis of local structures using micro/nano beam.
BL14B2	Engineering Science Research II	(Sept. 2007)	X-ray imaging. XAFS in a wide energy range (5–72 keV). XAFS of dilute systems and thin films. Time-resolved XAFS by quick scan (Time-resolved QXAFS).
BL19B2	Engineering Science Research I	(Nov. 2001)	Residual stress measurement. Structural analysis of thin film, surface and interface. Powder X-ray diffraction. X-ray topography. Ultrasmall-angle X-ray scattering.
BL20XU	Medical and Imaging II	(Sept. 2001)	X-ray micro-/nano-imaging: micro-CT, nano-CT (15–37.7 keV), refraction/phase contrast imaging. X-ray diffraction tomography (XRD-CT), microbeam/scanning X-ray microscope. Research and development of X-ray optics and optical elements, coherent X-ray optics. Ultra small-angle X-ray scattering (USAXS, 23 keV).
BL20B2	Medical and Imaging I	(Sept. 1999)	Micro-radiography, micro-angiography, micro-tomography, and refraction-contrast imaging are the mainly used techniques. BL20B2 is also applicable to small-animal experiments for medical research. Research and development of basic techniques for evaluation of optical devices and X-ray imaging.
BL25SU	Soft X-ray Spectroscopy of Solid	(Apr. 1998)	Research on electron states by photoemission spectroscopy (PES). Research on electronic band structures by angle-resolved photoemission spectroscopy (ARPES). Study of magnetic states by magnetic circular dichroism (MCD) of soft X-ray absorption. Analysis of surface atomic arrangement by photoelectron diffraction (PED). Nano-spectroscopic analysis using low-energy/photoemission electron microscope (SPELEEM).
BL27SU	Soft X-ray Photochemistry	(May 1998)	Soft X-ray photoabsorption spectroscopy of dilute samples in partial fluorescence yield mode. Surface and interface analysis using depth-resolved soft X-ray photoabsorption spectroscopy. Soft X-ray photoabsorption spectroscopy under ambient atmospheric pressure. Spectroscopy using soft X-ray microbeam. Observation of electron state in solids by soft X-ray emission spectroscopy.
BL28B2	White Beam X-ray Diffraction	(Sept. 1999)	White X-ray diffraction: X-ray topography. Energy-dispersive strain measurement. Time-resolved energy-dispersive XAFS (DXAFS) for studies of chemical and/or physical reaction process. Radiation therapy. High energy (~200 keV) X-ray microtomography.
BL35XU	Inelastic and Nuclear Resonant Scattering	(Sept. 2001)	Phonons in solids and atomic dynamics in disordered materials by inelastic X-ray scattering. Atomic and molecular dynamics by nuclear resonant inelastic scattering and quasi-elastic scattering. Synchrotron-radiation-based Mössbauer spectroscopy. Nuclear excitation.
BL37XU	Trace Element Analysis	(Nov. 2002)	X-ray microbeam/nano-beam spectrochemical analysis. X-ray spectroscopic imaging. Ultratrace-element analysis. High-energy X-ray fluorescence analysis. Projection/scanning/imaging XAFS microscopy. High brightness XAFS. Coherent diffraction imaging XAFS microscopy.
BL39XU	Magnetic Materials	(Oct. 1997)	X-ray magnetic circular dichroism (XMCD) spectroscopy and element-specific magnetometry (ESM). X-ray emission spectroscopy (XES) and its magnetic circular dichroism. XMCD magnetic imaging and local ESM using micro/nanobeam, XAFS microscopy and local ESM, XAFS and XMCD at high pressure. X-ray spectroscopy using variable X-ray polarization (horizontally/perpendicularly linear or circular).
BL40XU	High Flux	(Apr. 2000)	Fast time-resolved X-ray diffraction and scattering experiments. X-ray photon correlation spectroscopy, X-ray fluorescence analysis. Microbeam X-ray diffraction and scattering experiments. Micro-crystallography.
BL40B2	Structural Biology II	(Sept. 1999)	Small-angle X-ray scattering (SAXS).
BL41XU	Structural Biology I	(Oct. 1997)	Macromolecular crystallography. Micro-crystallography. Ultra-high resolution structural analysis.
BL43IR	Infrared Materials Science	(Apr. 2000)	Infrared microspectroscopy.
BL45XU	Structural Biology III	(Apr. 2019)	Macromolecular crystallography. Micro-crystallography. Automation and high throughput data collection for protein crystallography.
BL46XU	Engineering Science Research III	(Nov. 2000)	Hard X-ray photoemission spectroscopy.
BL47XU	HAXPES·μCT	(Oct. 1997)	X-ray optics. Planetary science. Materials science. Applied materials science.

BL #	Beamline Name	(Public Use) or (First Beam)	Areas of Research and Available Techniques
	● Contract Beamlines as of April 2022		
BL03XU	**Advanced Softmaterial** (Advanced Softmaterial Beamline Consortium)	(Nov. 2009)	Structural characterization of softmaterials using small- and wide-angle X-ray scattering. Grazing-incidence small- and wide-angle X-ray scattering for thin films.
BL07LSU	**The University-of-Tokyo Outstation Beamline for Materials Science** (The University of Tokyo)	(Oct. 2009)	Ambient pressure photoemission spectroscopy, nano-beam photoemission spectroscopy, high-resolution soft X-ray emission spectroscopy, and any methods requiring the highly brilliant soft X-ray beam.
BL08B2	**Hyogo BM** (Hyogo Prefecture)	(Jun. 2005)	XAFS in a wide energy region. Small angle X-ray scattering. X-ray topography. Imaging. X-ray diffraction for multipurpose.
BL11XU	**QST Quantum Dynamics I** (National Institutes for Quantum Science and Technology)	(Oct. 1998)	Nuclear resonant scattering. Surface and interface structure with MBE. Resonant inelastic X-ray scattering. X-ray emission spectroscopy.
BL12B2	**NSRRC BM** (National Synchrotron Rad. Res. Center)	(Oct. 2000)	X-ray absorption spectroscopy. Powder X-ray diffraction. High resolution X-ray scattering. Protein crystallography.
BL12XU	**NSRRC ID** (National Synchrotron Rad. Res. Center)	(Dec. 2001)	Non-resonant or resonant inelastic X-ray scattering. Hard X-ray photoemission spectroscopy.
BL14B1	**QST Quantum Dynamics II** (National Institutes for Quantum Science and Technology)	(Dec. 1997)	Materials science at high pressure. XAFS. Time-resolved energy-dispersive XAFS (DXAFS).
BL16B2	**SUNBEAM BM** (SUNBEAM Consortium)	(Oct. 1998)	Characterization of secondary battery related materials, semiconductors, fuel cells, catalysts, and several industrial materials with using X-ray absorption fine structure measurements, X-ray diffraction (including X-ray reflectivity technique), X-ray topography and computed tomography/laminography.
BL16XU	**SUNBEAM ID** (SUNBEAM Consortium)	(Oct. 1998)	Characterization of secondary battery related materials, semiconductors, fuel cells, catalysts, and structural materials using X-ray diffraction, X-ray microbeam based evaluation techniques (including X-ray magnetic circular dichroism), hard X-ray photoelectron spectroscopy and fluorescence X-ray analysis.
BL22XU	**JAEA Actinide Science I** (Japan Atomic Energy Agency)	(May 2002)	HAXPES. XAFS. Residual stress/strain distribution analysis. High-pressure science. Coherent X-ray diffraction. Surface X-ray diffraction. High-energy X-ray diffraction. Time-resolved X-ray diffraction.
BL23SU	**JAEA Actinide Science II** (Japan Atomic Energy Agency)	(Feb. 1998)	Surface chemistry with supersonic molecular beam. Photoelectron spectroscopy. Magnetic circular dichroism. STXM.
BL24XU	**Hyogo ID** (Hyogo Prefecture)	(May. 1998)	Microbeam small- and wide-angle X-ray scattering for local structure analysis. Scanning and imaging microscope, micro-tomography, coherent diffraction. Microbeam X-ray diffraction and bright field X-ray topography for electronic device materials. Near-ambient pressure hard X-ray photoelectron spectroscopy.
BL28XU	**Advanced Batteries** (Kyoto University)	(Apr. 2012)	Characterization of rechargeable battery reactions and battery related materials by resonant X-ray diffraction, X-ray absorption spectroscopy (XAS), X-ray diffraction spectroscopy (XDS), and hard X-ray photoemission spectroscopy (HAXPES).
BL31LEP	**Laser-Electron Photon II** (RCNP, Osaka University)	(Oct. 2013)	Production of high intensity GeV photon beam by laser-backward Compton scattering. Hadron physics via photonucleon and photonuclear reactions. Test and calibration of detectors with GeV gamma-ray and converted electrons/positrons.
BL33LEP	**Laser-Electron Photon** (RCNP, Osaka University)	(Jun. 1999)	Under removal work.
BL33XU	**TOYOTA** (TOYOTA Central R&D Labs., Inc.)	(Apr. 2009)	Time-resolved XAFS. 3DXRD. Characterization of industrial materials and devices (e.g. catalysts, lightweight bodies, secondary batteries, fuel cells, and power modules).
BL44XU	**Macromolecular Assemblies** (IPR, Osaka University)	(May 1999)	Crystal structure analysis of biological macromolecular assemblies (e.g., membrane protein complexes, protein complexes, protein-nucleic acid complexes, and viruses).
	◆ RIKEN Beamlines as of April 2022		
BL05XU	**R&D-ID**	(Mar. 2004)	R&D of high-energy X-ray optics, instruments, and applications; structural and dynamical research using small and wide angle scattering.
BL15XU	**RIKEN Materials Science III**	(Oct. 2021)	Advanced diffraction and scattering with high-energy X-rays.
BL17SU	**RIKEN Coherent Soft X-ray Spectroscopy**	(Sept. 2003)	High resolution photoemission spectroscopy; soft X-ray emission spectroscopy; soft X-ray diffraction spectroscopy; soft X-ray microspectroscopy.
BL19LXU	**RIKEN SR Physics**	(Oct. 2000)	SR science with highly brilliant X-ray beam.
BL26B1	**RIKEN Structural Genomics I**	(Apr. 2002)	Structural biology research based on single crystal X-ray diffraction.
BL26B2	**RIKEN Structural Genomics II**	(Apr. 2002)	Structural biology research based on single crystal X-ray diffraction.
BL29XU	**RIKEN Coherent X-ray Optics**	(Dec. 1998)	X-ray optics, especially coherent X-ray optics.
BL32XU	**RIKEN Targeted Proteins**	(Oct. 2009)	Protein microcrystallography.
BL32B2	**R&D-BM**	(May 2002)	X-ray computed tomography; X-ray diffraction; X-ray absorption fine structure; R&D of SR instruments.
BL36XU	**RIKEN Materials Science II**	(Apr. 2020)	Time resolved XAFS and X-ray diffraction; 2D/3D scanning XAFS imaging; 3D computed tomography/laminography XAFS imaging; X-ray emission spectroscopy; ambient pressure hard X-ray photoelectron spectroscopy; pink beam experiments.
BL38B1	**RIKEN Structural Biology I**	(Oct. 2000)	Structure study of non-crystalline biological materials using small-angle scattering and diffraction techniques.
BL38B2	**Diagnosis Beamline**	(Sept. 1999)	Accelerator beam diagnostics.
BL43LXU	**RIKEN Quantum NanoDynamics**	(Oct. 2011)	High resolution inelastic X-ray scattering for investigating atomic and electronic dynamics.
BL44B2	**RIKEN Materials Science I**	(Feb. 1998)	Structural materials science research using powder X-ray diffraction.

IV. User Program and Statistics

SPring-8 calls for public use proposals twice a year, in principle. The submitted proposals are reviewed by the SPring-8 Proposal Review Committee (SPring-8 PRC). Since 1997, SPring-8 has accepted a variety of proposals. For the promotion of research on industrial applications at SPring-8, currently, Industrial Application Proposals account for approximately 16%–19% of the total number of proposals conducted at various public beamlines. There will always be companies and research institutes that find it difficult to retain specialized staff and to accommodate the need for quick access to SPring-8. To appropriately respond to such circumstances, the SPring-8 Measurement Service is provided.

In this branch of service, JASRI staff members perform measurements on behalf of users. Users may choose either to come to SPring-8 and be present during the measurements or to simply send their samples to SPring-8. Currently, JASRI has been expanding the purview of the SPring-8 Measurement Service to five measurement methods (XAFS, Powder X-ray Diffraction, HAXPES, GIXD/XRR, and SAXS). In addition, JASRI provides Protein Crystallography Automatic Data Collection at Macromolecular Crystallography beamlines. Therefore, users can choose either to come to SPring-8 and be present during the measurements or to simply send their samples to SPring-8. Since the 2022A period, JASRI has been calling for long-term graduate student proposals. The purpose of the Long-Term Graduate Student Proposals is to contribute to the development of human resources who will support and further develop synchrotron radiation sciences. SPring-8 has been affected by COVID-19 to a small extent in FY2021; as a result, the SPring-8 Measurement Service and the Protein Crystallography Automatic Data Collection have become more widely used. Furthermore, SPring-8 is developing a remote-operation system that allows users to control experimental instruments remotely to promote remote access. The number of experiments conducted at and the number of user visits to the public and contract beamlines are summarized in Fig. 3. Some of the proposals are for proprietary use, for which refereed reports are not required. Figures 4 to 13 show information on user programs.

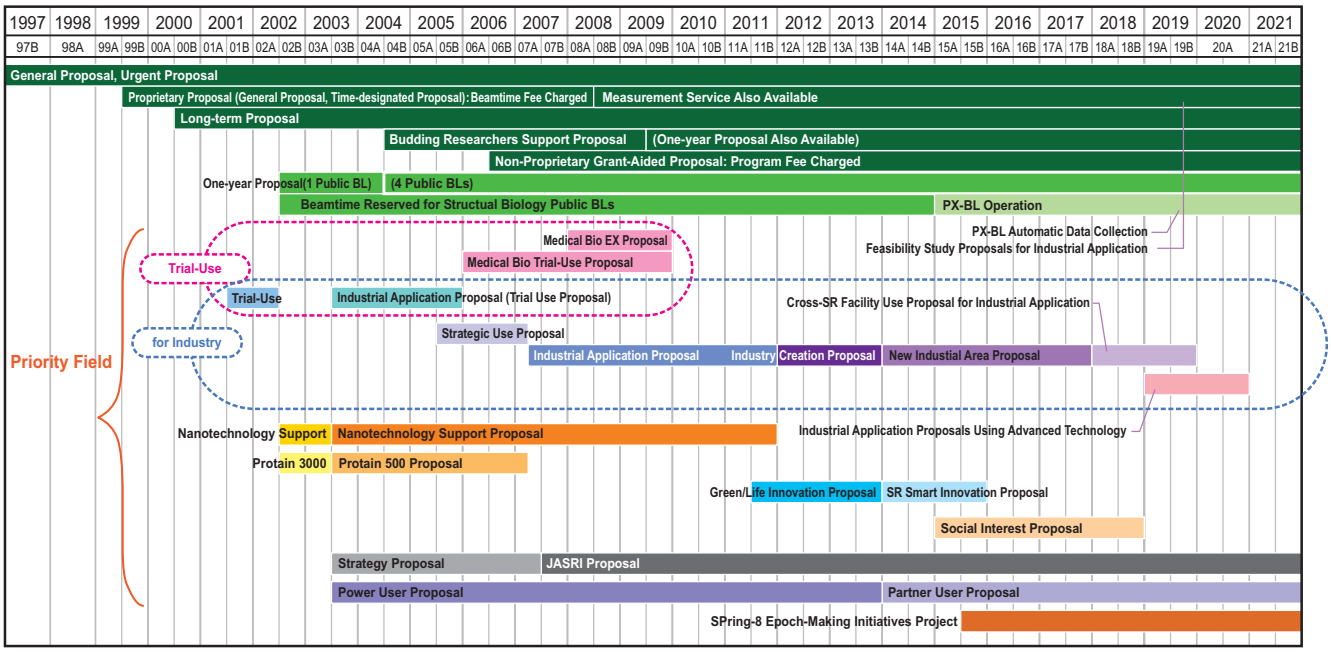


Fig. 3. Categories of proposals for the public beamlines.

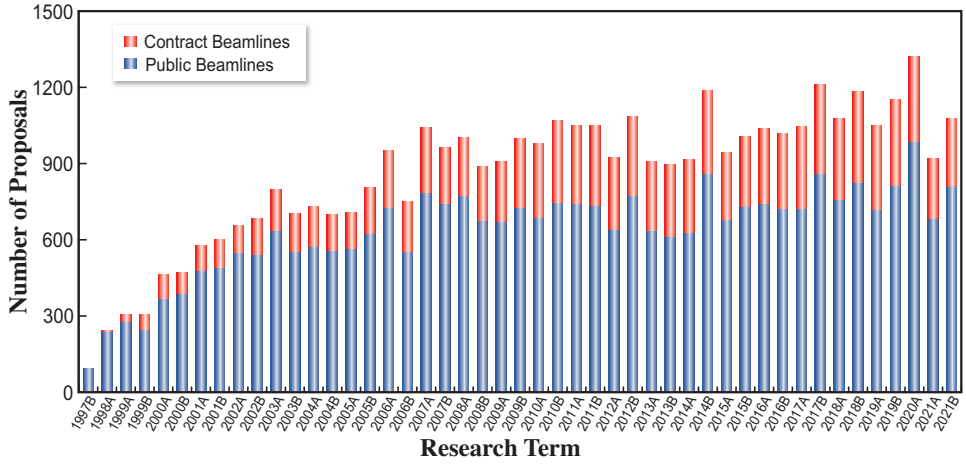


Fig. 4. Numbers of conducted experiments.

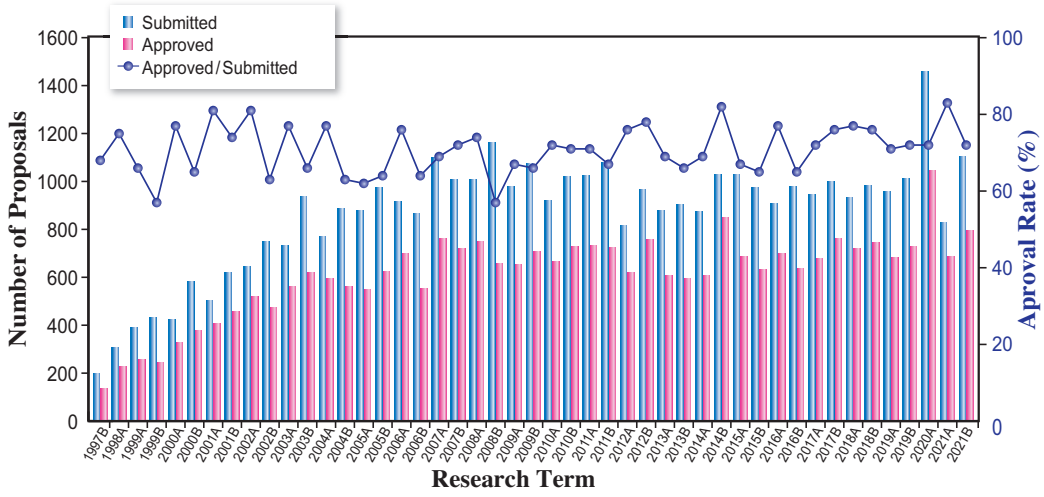


Fig. 5. Numbers of submitted proposals and approved proposals by research term (public beamlines).

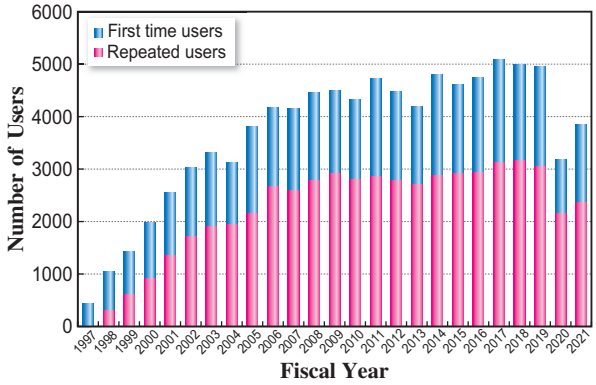


Fig. 6. Numbers of users by fiscal year.

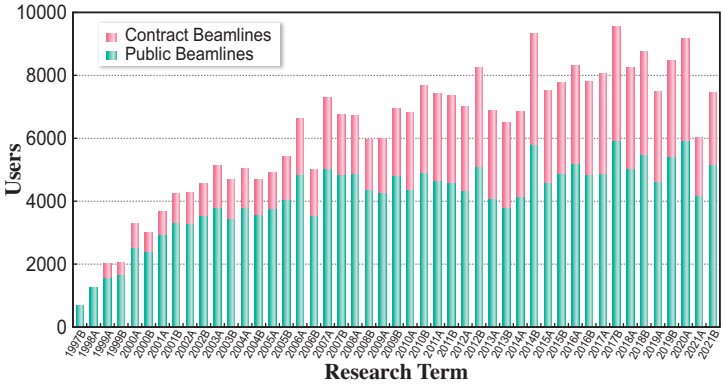


Fig. 7. Numbers of users visits by research term.

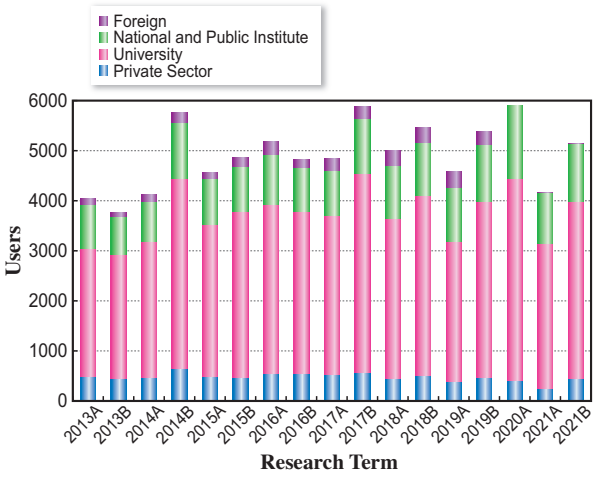


Fig. 8. Numbers of users by affiliation categories (public beamlines).

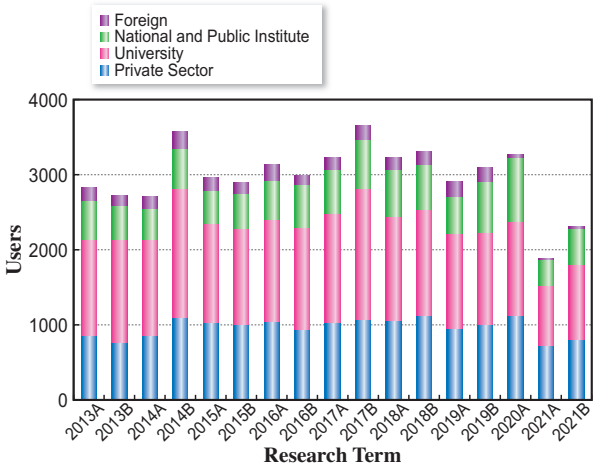


Fig. 9. Numbers of users by affiliation categories (contract beamlines).

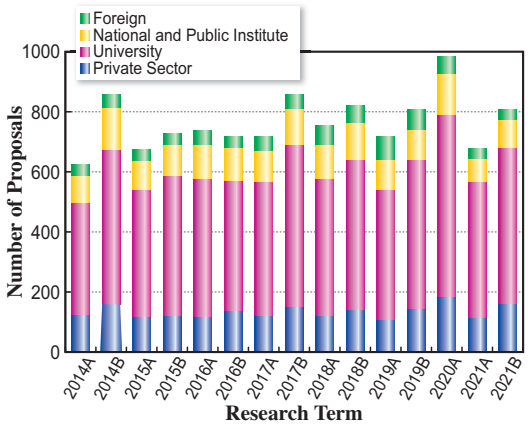


Fig. 10. Numbers of conducted proposals by affiliation (public beamlines).

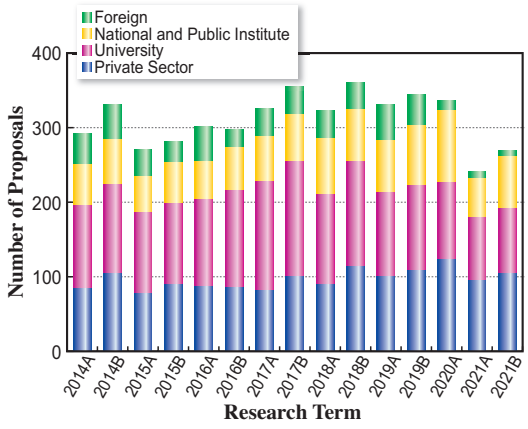


Fig. 11. Numbers of conducted proposals by affiliation categories (contract beamlines).

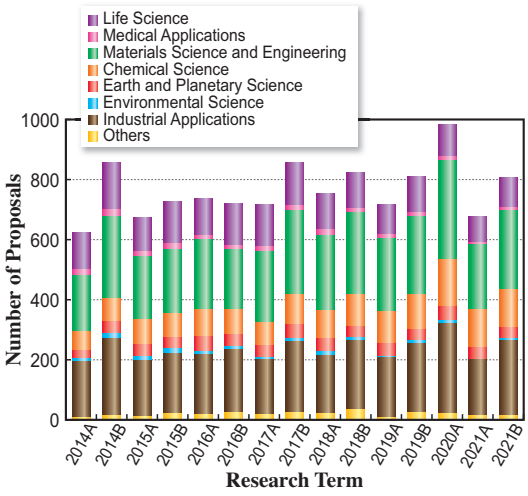


Fig. 12. Numbers of conducted proposals by research area (public beamlines).

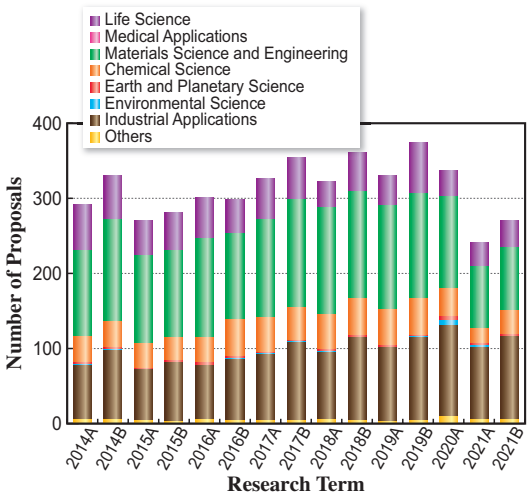


Fig. 13. Numbers of conducted proposals by research area (contract beamlines).

V. Research Outcome

As of March 2022, the total number of registered refereed papers from SPring-8 was 19,735. Figure 14 shows the annual statistics of refereed papers.

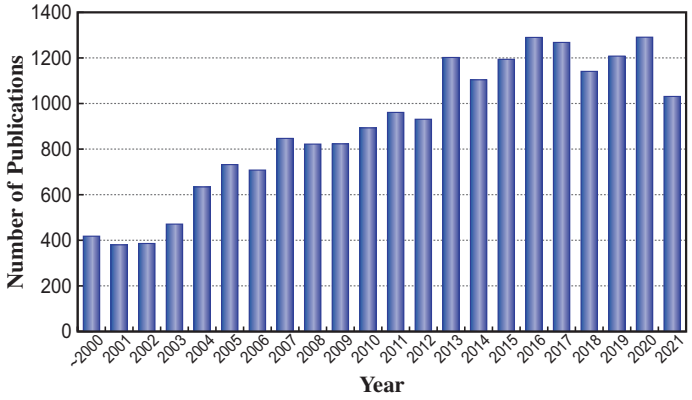


Fig. 14. Number of refereed publications.

VI. Budget and Personnel

When SPring-8 started operation in 1997, it was jointly managed by RIKEN, JAERI (now JAEA), and JASRI. However, JAERI withdrew from the management of SPring-8 on September 30, 2005. SPring-8 is currently administered by RIKEN and JASRI collaboratively.

The total budget for the operation of SPring-8 in FY2021 was about 9.1 billion yen. As of October 2021, RIKEN and JASRI have a total of 462 staff members. Figure 15 shows the annual budget allocated to operations, maintenance, and promotion of SPring-8. Figure 16 shows the manpower at RIKEN and JASRI.

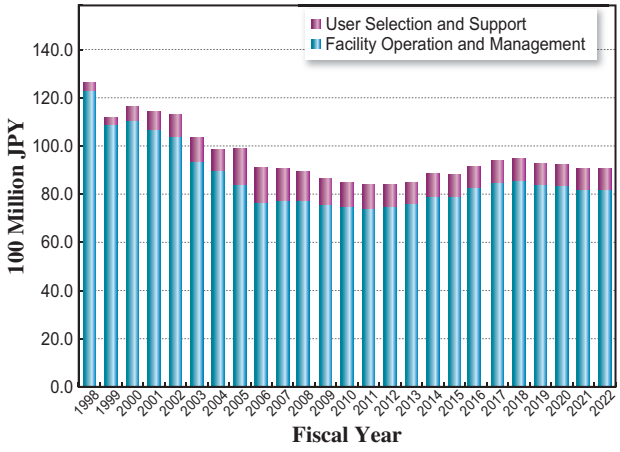


Fig. 15. SPring-8 budget.

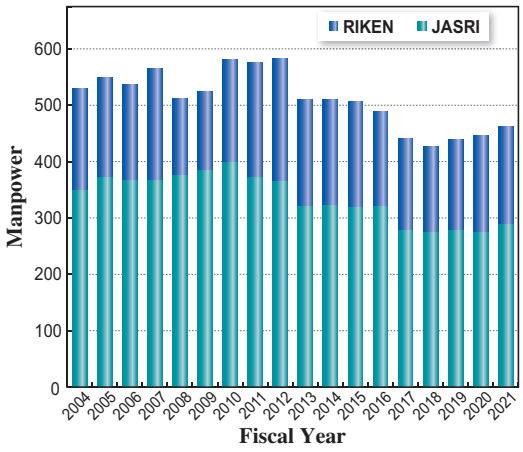


Fig. 16. Personnel at SPring-8: JASRI and RIKEN.

VII. Research Complex

The facilities of SPring-8, SACLA, and NewSUBARU form the Center of Excellence (COE) at the SPring-8 campus where JASRI, public beamline users, the contractors of contract beamlines, RIKEN, and University of Hyogo work in close cooperation, forming a research complex where all members play their own role in delivering high-quality results to the field of synchrotron radiation science and technology. The organizational charts of RIKEN and JASRI, which are at the center of this research complex, are shown in Figs. 17 and 18, respectively.

Fig. 17. RIKEN Harima Campus chart as of April 2022.

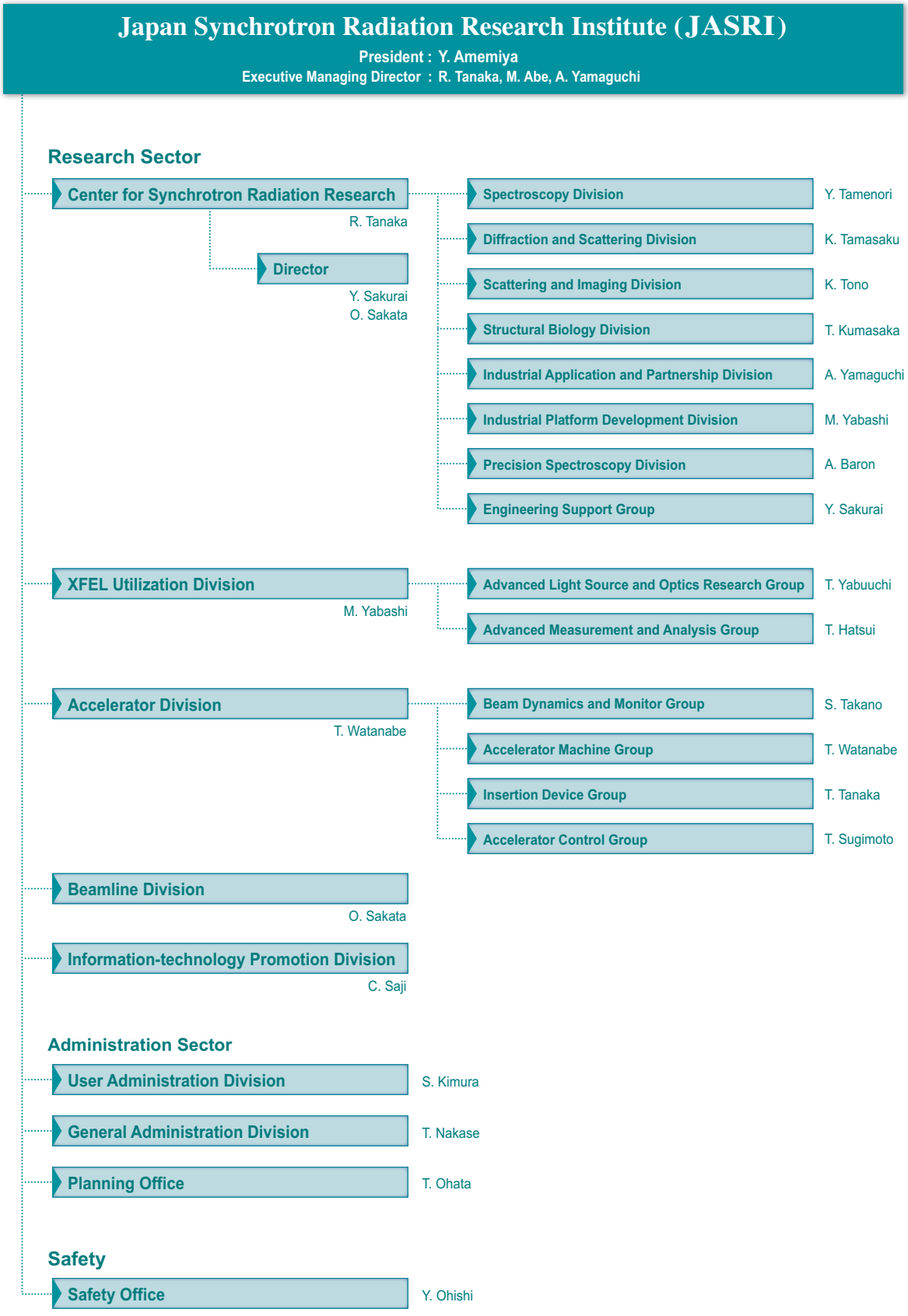


Fig. 18. JASRI chart as of April 2022.

VIII. SPring-8 Users Community (SPRUC)

Prof. A. Kimura
Hiroshima University
SPRUC Chairman FY2020

SPRUC is a user society that consists of all users of SPring-8/SACLA. In addition to individuals, representative organizations of 26 institutes (principal universities, national/international research institutes, industries, and beamline consortiums) participate in SPRUC to discuss further promotion of the utilization of SPring-8 from strategic and perspective viewpoints. Prof. Akio Kimura, Hiroshima University, has been serving as the president of SPRUC for a two-year term since FY2020.

As one of the key activities of SPRUC, the SPring-8 Symposium is held annually at the site of one of the representing organizations jointly with RIKEN and JASRI. SPring-8 Symposium 2021 "Backcasting from SPring-8 Future Vision " was held on September 17 and 18 with a hybrid style of on-site and online presentations. As indicated by the theme, the major issue of the symposium was not how to respond to the rapidly changing modern society on the spot, but rather to draw a future vision of SPring-8 and discuss the current and future use of the facility, including the importance of human resource development, by backcasting it as a goal we should achieve. The ceremony to present the SPRUC 2021 Young Scientist Award, which was conferred on Dr. Yuki Takayama, Graduate School of Science, University of Hyogo, and Dr. Natsuki Tomida, Research Center for Nuclear Physics, Osaka University, was also held. The holding of SPring-8 Symposium 2022 will be considered on the basis of the future status of the COVID-19 pandemic.

SPRUC supported the “SPring-8 Summer School” for the enhancement of users’ research competency and also hosted the “SPring-8 Autumn School” with JASRI to acquire new users and develop human resources. For the Autumn School, the SPRUC research groups contributed to planning the lectures. Although the Autumn School had been scheduled to be held in September, the plan was forced to be postponed to December owing to the recurring COVID-19 pandemic. Despite the difficult situation, both schools were successfully held. We would like to take this opportunity to thank all the people involved.

SPRUC2021 Young Scientist Award
Prof. A. Kimura, Dr. N. Tomida, and Dr. Y. Takayama

SPRUC continues to cohost the beamline upgrade workshop, the fourth of which was held on March 14 with RIKEN and JASRI. The workshop was planned to vitalize information exchange between members of SPRUC and the facility. The workshop focused mainly on mutual consensus regarding the reorganization and upgrade of diffraction and scattering beamlines such as BL13XU, spectroscopy beamlines such as BL39XU, and imaging and small angle X-ray scattering beamlines. The facility presented the latest situation of their reorganization, future prospects and related problems, and the members discussed demands and suggestions for beamline upgrades.

The fifth-term SPRUC research groups were voluntarily organized in each research field, and the research groups actively conducted research meetings. Each SPRUC research group has been collecting ideas and needs for beamline reorganization and innovative experimental techniques toward SPring-8 II, and has presented opinions and demands obtained through discussion in each field. As in the past, the sixth-term SPRUC research groups were recruited in the four research fields, namely, Life Science, Fundamental Characterization, Applied Materials, and Measurements, and will be launched next fiscal year.

IX. Outreach Activities

To reach out to new users in unexplored fields of application, SPring-8 holds various serialized seminars named “Workshop on Advanced Techniques and Applications at SPring-8”. From last year, most of the workshops are being held as video conferences because of COVID-19. Here are some representatives.

- 63rd: Advances in Measurement Informatics and Data Processing Using External Computational Resources
  August 31, 2021 • Video conference
- 65th: X-ray Emission Spectroscopy Analysis Technology and Beamline Reconstruction Plan in SPring-8-II
  October 22, 2021 • Video conference
- 64th: Frontiers of Development in Energy Catalysts and Fuel Cells
  December 3, 2021 • AP Shinagawa and Video conference

Also taking advantage of video conferencing, we held a weekly “Seminar on Advanced Techniques and Applications at SPring-8”. It has been held every Tuesday evening since January 2021. Over 2,500 participants in total took part in the eight seminars in the period from 11 May to 29 June.