SPring-8

I. Introduction

SPring-8 was stably operated throughout FY2016 with the total operation time of the accelerator complex and the total user beam time of 4951.7 h and 4125.5 h, respectively, and a total downtime of 23.1 h. Because of the major renovation of an extra-high-tension power source from the end of December 2016 to the end of March 2017, SPring-8 had to complete all its operations by the middle of December 2016, making the machine schedule quite tight and, thus, challenging.

Regarding its research proposal system, the duration of the designation period of a priority field for the public beamlines "New Industrial Area Program" has been extended. Concerning the contract beamlines, there were five interim reviews conducted for WEBRAM (BL15XU, National Institute for Materials Science), Laser-Electron Photon II (BL31LEP, Research Center for Nuclear Physics, Osaka University). NSRRC BM (BL12B2), NSRRC ID (BL12XU), and RISING II (BL28XU, Kyoto University), and the continuation of their projects was authorized. Upon the expiration of their contract terms, reviews were also conducted for JAEA Actinide Science I (BL22XU), JAEA Actinide Science II (BL23SU), QST Quantum Dynamics I (BL11XU), QST Quantum Dynamics II (BL14B1), and Catalytic Reaction Dynamics for Fuel Cells (BL36XU, The University of Electro-Communications), and their proposals for the next term were approved.

At the time of writing this report, SPring-8 users numbered as many as 11,000, all of whom are respected 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 2016, the SPring-8 Symposium was held at Kwansei Gakuin University. SPring-8 also accelerates communication between users and industry. The Joint Conference on Industrial Applications of SPring-8, held in Kobe on September 7-8, 2016, had 248 participants. As part of its continuous effort towards fostering human resources in synchrotron sciences, SPring-8 organized the 16th SPring-8 Summer School with 91 students of graduate schools nationwide, in cooperation with Hyogo University, Kwansei Gakuin University, the University of Tokyo, Okayama University, Osaka University, Japan Atomic Energy Agency, National Institutes for Quantum and Radiological Science and Technology, and RIKEN.

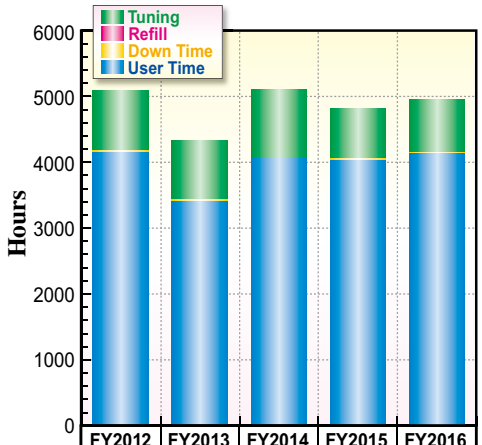
II. Machine Operation

The operation statistics for the last five fiscal years are shown in Fig. 1. In FY2016, the total operation time of the accelerator complex was 4951.7 h. The operation time of the storage ring was 4941.1 h, 84.0% of which (4125.5 h) was for SR experiments. This excellent figure of user time represents a storage ring availability of 99.4%, which ranks with the best record of 99.5% established over the previous two years. The downtime resulting from failure accounted for 0.56% (23.1 h) of the total user time. This is somewhat longer compared with that (16.8 h) in FY2015. This is because in FY2016, severe damage was incurred as a result of natural disasters such as an earthquake and power loss due to thunderstorms. The intensity of the light source, i.e., the stored current is kept extremely stable thanks to the top-up operation, in which the current is filled up at any time on demand. The dead band of the stored current in the top-up operation is routinely 0.03 mA (0.03%) and the current stays within 0.1% in 99.6% of the user time in FY2016, as well as in FY2015.

The variety of operation modes is one of the characteristics of SPring-8. The operation modes are grouped into the multibunch, several-bunch, and hybrid-filling modes. There has been no user operation in the multibunch mode since FY2011. The several-bunch mode consists of equally spaced bunches or bunch trains, i.e., 203 bunches, or 29 trains of 11 bunches, and the hybrid-filling mode is composed of a long bunch train and isolated single bunches, as shown in Table 1, where the share of each operation mode is also shown. An isolated bunch impurity is routinely maintained at less than 10^{-8} in the top-up operation by bunch cleaning in the booster. The bunch current is also kept constant within a 1% band by the top-up operation. In the

operation of the 203 bunches mode in the 2nd, 3rd, and 5th cycles of user time, beam instability occurred, so the equivalent filling mode of 406 bunches was applied. By the machine tuning, the instability was suppressed, and the 203 bunches mode in the 7th cycle was operated as before.

Table 2 summarizes the beam parameters of the storage ring.



	FY2012	FY2013	FY2014	FY2015	FY2016
Accelerator Operation Time	5078.8	4330.0	5099.3	4817.9	4951.7
Storage Ring Operation Time	5063.1	4265.5	5080.7	4804.8	4941.1
Tuning & Study (Acc. & BL)	883.8	898.0	1019.3	767.2	803.1
Refill	5.2	3.5	5.1	5.3	3.4
Down Time	39.2	20.0	17.1	16.8	23.1
Mean Time Between Failures	107.7	213.0	163.2	202.8	229.2
Achieved User Time	4155.6	3408.5	4057.8	4033.9	4125.5
Planning User Time	4200.0	3432.0	4080.0	4056.0	4152.0
Availability (%)	98.9	99.3	99.5	99.5	99.4

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

Table 1. Operation modes in FY2016

	Single bunch current (mA)	Share of operation time (%)
203 bunches		24.9
4 bunch-train × 84		8.1
11 bunch-train × 29		25.4
1/7-filling + 5 single bunches	3	9.2
2/29-filling + 26 single bunches	1.4	3.5
1/14-filling + 12 single bunches	1.6	8.7
4/58-filling + 53 single bunches	1	0.0
11/29-filling + 1 single bunch	5	20.2

Table 2. Beam parameters of the SPring-8 storage ring

Energy [GeV]	8
Number of buckets	2436
Tunes (ν_x / ν_y)	41.14 / 19.34
Current [mA]:	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 (σ_x' / σ_y')* [μrad]	
Long ID section	8 / 0.7
ID section	9 / 1.0
BM1 section	58 / 0.5
BM2 section	68 / 0.5
Lifetime [h]:	
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

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, 56 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
(2) Contract Beamlines
(3) RIKEN Beamlines

There are now 26 public beamlines in full operation. The beamlines that are proposed and constructed by external organizations, such as

universities, research institutes, private companies and consortiums, are called contract beamlines and are exclusively used by the contractors for their own research purposes. At present, 19 contract beamlines are in operation. The contract beamlines include the NSRRC BM (BL12B2) and NSRRC ID (BL12XU) beamlines, which were constructed by the National Synchrotron Radiation Research Center of Taiwan. The beamlines constructed by RIKEN except for public beamlines are called RIKEN beamlines, and are mainly used for RIKEN's own research activities, with partial availability for public use. RIKEN is now operating 11 beamlines and is reconstructing one beamline.

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 beamlines are presented in Table 3.

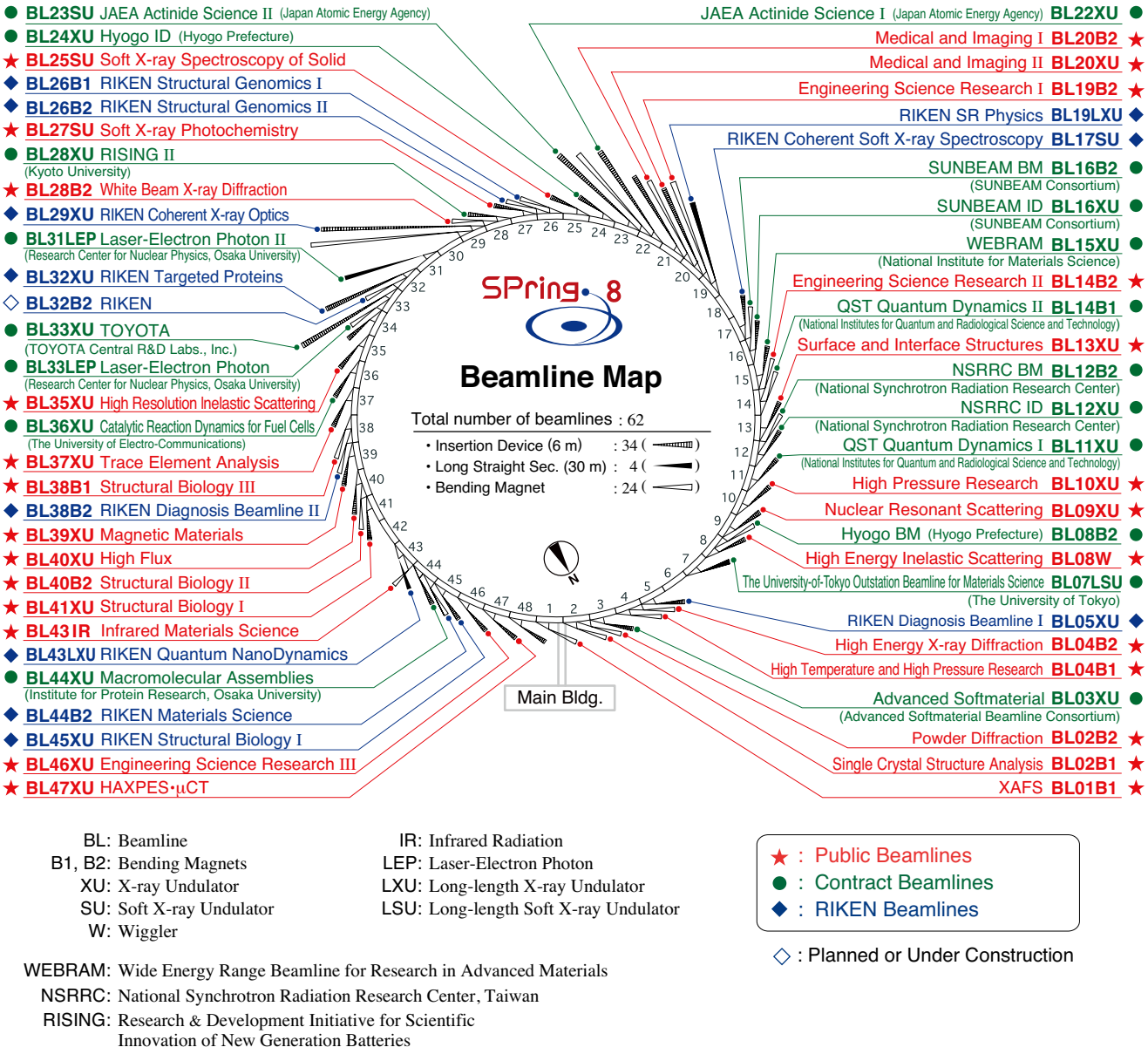


Fig. 2. Beamline map.

Table 3. List of beamlines

BL #	Beamline Name	(Public Use) or (First Beam)	Areas of Research and Available Techniques
★ Public Beamlines			
BL01B1	XAFS	(Oct. 1997)	XAFS in wide energy region (3.8 to 113 keV). XAFS of dilute systems and thin films. Quick XAFS with a time resolution of seconds to tens of seconds.
BL02B1	Single Crystal Structure Analysis	(Oct. 1997)	Charge density study and crystal structure analysis from accurate single crystal diffraction measurements. (X-ray energy range: 8 – 115 keV)
BL02B2	Powder Diffraction	(Sept. 1999)	Charge density study and phase identification of crystalline materials from accurate powder diffraction measurements. (X-ray energy range: 12.4 – 35 keV)
BL04B1	High Temperature and High Pressure Research	(Oct. 1997)	High temperature and high pressure research with the multi-anvil press by powder X-ray diffraction, radiography and ultrasonic measurement.
BL04B2	High Energy X-ray Diffraction	(Sept. 1999)	Pair distribution function analysis for glass, liquid, and amorphous materials. High-energy X-ray total scattering. Containerless levitation.
BL08W	High Energy Inelastic Scattering	(Oct. 1997)	Magnetic Compton scattering. High-resolution Compton scattering. High-energy Bragg scattering. High-energy fluorescent X-ray analysis.
BL09XU	Nuclear Resonant Scattering	(Oct. 1997)	Lattice dynamics using nuclear inelastic scattering. Mössbauer spectroscopy, especially for the surface/interface study and under the extreme conditions. Hard X-ray photoelectron spectroscopy (HAXPES). Depth analysis of HAXPES with high flux and energy resolution.
BL10XU	High Pressure Research	(Oct. 1997)	Structure analysis and phase transitions under ultra high pressure (DAC experiment). Earth and planetary science.
BL13XU	Surface and Interface Structures	(Sept. 2001)	Atomic-scale structural analysis of surfaces and interfaces of crystalline materials, ultra-thin films, and nanostructures. Surface X-ray diffraction (SXRD). Microbeam diffraction.
BL14B2	Engineering Science Research II	(Sept. 2007)	XAFS in wide energy region (3.8 to 72 keV). XAFS of dilute systems and thin films.
BL19B2	Engineering Science Research I	(Nov. 2001)	Residual stress measurement. Structural analysis of thin film, surface, interface. Powder diffraction. X-ray imaging, X-ray topography. Ultra-small angle X-ray scattering.
BL20XU	Medical and Imaging II	(Sept. 2001)	Microimaging. Hard X-ray microbeam/scanning microscopy, imaging microscopy, microtomography, phase-contrast microtomography X-ray diffraction tomography (XRD-CT), X-ray holography, coherent X-ray optics, and other experiments on X-ray optics and developments of optical elements. Refraction-enhanced imaging, phase-contrast CT. Ultra-small angle scattering.
BL20B2	Medical and Imaging I	(Sept. 1999)	Microimaging: microtomography, phase-contrast microtomography with grating interferometer for biological specimen and other kinds of specimen. Evaluation and development of various kinds of optical elements for novel imaging techniques. Large field X-ray topography.
BL25SU	Soft X-ray Spectroscopy of Solid	(Apr. 1998)	Study of electronic state of solids by soft X-ray photoemission spectroscopy (PES) including angle-resolved PES (ARPES). Atomic arrangement analysis of surfaces by photoelectron diffraction (PED) technique using two-dimensional photoemission analyzer. Magnetic state analysis by magnetic circular dichroism (MCD) of soft X-ray absorption and its element-specific magnetization curve measurements. Chemical and magnetic imaging by soft X-ray scanning microscopy and photoelectron emission microscopy (PEEM).
BL27SU	Soft X-ray Photochemistry	(May 1998)	Ambient atmospheric pressure soft X-ray photoabsorption spectroscopy. Chemical state analysis of light elements in dilute samples (NEXAFS). Elemental and chemical mapping using micro soft X-ray beam. Soft X-ray emission spectroscopy for solids.
BL28B2	White Beam X-ray Diffraction	(Sept. 1999)	White X-ray diffraction and topography. Time-resolved energy-dispersive XAFS (DXAFS) for studies of chemical and/or physical reaction process. Biomedical imaging and radiation biology studies. High energy X-ray microtomography.
BL35XU	High Resolution Inelastic Scattering	(Sept. 2001)	Materials dynamics on ~meV energy scales using inelastic X-ray scattering (IXS).
BL37XU	Trace Element Analysis	(Nov. 2002)	X-ray microbeam spectrochemical analysis. Ultra trace element analysis. High energy X-ray fluorescence analysis.
BL38B1	Structural Biology III	(Oct. 2000)	Structural biology. Macromolecular crystallography. Automatic data collection.
BL39XU	Magnetic Materials	(Oct. 1997)	X-ray magnetic circular dichroism (XMCD) spectroscopy and element-specific magnetometry under multiple-extreme conditions. XMCD/XAS using a 100 nm focussed X-ray beam. X-ray emission spectroscopy. Resonant X-ray magnetic scattering.
BL40XU	High Flux	(Apr. 2000)	Time-resolved diffraction and scattering experiments. Microbeam X-ray diffraction and scattering experiments. X-ray photon correlation spectroscopy. Fluorescence analysis. Quick XAFS. Submicrometer-scale single crystal structure analysis with high flux and zone plate focused X-ray beam. Single shot imaging with X-ray choppers. Laser pump-X-ray probe experiment.
BL40B2	Structural Biology II	(Sept. 1999)	Noncrystalline small and wide angle X-ray scattering.
BL41XU	Structural Biology I	(Oct. 1997)	Structural biology. Macromolecular crystallography. Microcrystallography. High resolution data collection.
BL43IR	Infrared Materials Science	(Apr. 2000)	Infrared microspectroscopy.
BL46XU	Engineering Science Research III	(Nov. 2000)	Structural characterization of thin films by X-ray diffraction and X-ray reflectivity measurement. Residual stress measurement. Time resolved X-ray diffraction measurement. Hard X-ray photoemission spectroscopy.
BL47XU	HAXPES·μCT	(Oct. 1997)	Hard X-ray photoelectron spectroscopy (HAXPES). Depth analysis of angle resolved HAXPES with wide acceptance lens. Projection type microtomography. Imaging type microtomography. Hard X-ray microbeam/scanning microscopy.

BL #	Beamline Name	(Public Use) or (First Beam)	Areas of Research and Available Techniques
	● Contract Beamlines		
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. X-ray diffraction and reflectivity measurements for softmaterials.
BL07LSU	**The University-of-Tokyo Outstation Beamline for Materials Science** (The University of Tokyo)	(Oct. 2009)	Time-resolved soft X-ray spectroscopy, nano-beam photoemission spectroscopy, ultra 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 for structural analyses of polymer and nanocomposite materials. X-ray topography. Imaging. Powder diffraction with a high angular-resolution.
BL11XU	**QST Quantum Dynamics I** (National Institutes for Quantum & Radiological Science & Technology)	(Oct. 1998)	Nuclear scattering. Surface and interface structure analysis with MBE. Inelastic X-ray scattering. XAFS.
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 & Radiological Science & Technology)	(Dec. 1997)	Materials science under high-temperature and high-pressure. *In situ* study on catalysis using dispersive XAFS. X-ray diffraction for structure physics.
BL15XU	**WEBRAM** (National Institute for Materials Science)	(Jan. 2000)	Hard X-ray photoelectron spectroscopy. High-precision X-ray powder diffraction.
BL16B2	**SUNBEAM BM** (SUNBEAM Consortium)	(Oct. 1998)	Characterization of secondary battery related materials, semiconductors, fuel cells, catalysts, and several industrial materials using X-ray absorption fine structure measurements, X-ray diffraction (including X-ray reflectivity technique) and X-ray topography.
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 photoemission spectroscopy and fluorescence X-ray analysis.
BL22XU	**JAEA Actinide Science I** (Japan Atomic Energy Agency)	(May 2002)	Materials science under high-pressure. Resonant X-ray scattering. Speckle scattering. Residual stress/strain distribution analysis.
BL23SU	**JAEA Actinide Science II** (Japan Atomic Energy Agency)	(Feb. 1998)	Surface chemistry with supersonic molecular beam. Biophysical spectroscopy. Photoelectron spectroscopy. Magnetic circular dichroism.
BL24XU	**Hyogo ID** (Hyogo Prefecture)	(May. 1998)	Surface/interface analysis for industry by fluorescent X-ray analysis, strain measurements and grazing incidence X-ray diffraction. Microbeam formation studies for material and life sciences. Scanning and imaging microscope. Micro-tomography. Micro-XAFS. Microbeam small- and wide-angle X-ray scattering for local structure analysis. Bright field X-ray topography.
BL28XU	**RISING II** (Kyoto University)	(Apr. 2012)	Characterization of rechargeable battery reactions and battery related materials by resonance 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)	Meson photoproduction from nucleon and nucleus. Photoexcitation of hyperons, nucleon resonances, and other exotic states. Photonuclear reactions. Beam diagnoses. Test and calibration of detectors with GeV photon beam.
BL33XU	**TOYOTA** (TOYOTA Central R&D Labs., Inc.)	(Apr. 2009)	Time-resolved XAFS. Characterization of industrial materials, such as catalysts, secondary batteries, fuel cells.
BL36XU	**Catalytic Reaction Dynamics for Fuel Cells** (The University of Electro-Communications)	(Jan.2013)	Real time analysis of catalytic reaction dynamics for fuel cells: time resolved XAFS and X-ray diffraction, 2D scanning microscopic XAFS, 3D computed tomography/laminography XAFS, ambient pressure hard X-ray photoelectron spectroscopy.
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		
BL05XU	**RIKEN Diagnosis Beamline I**	(Mar. 2004)	Accelerator beam diagnostics. R&D of accelerator components. Nano-forensic science.
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.
BL38B2	**RIKEN Diagnosis Beamline II**	(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**	(Feb. 1998)	Structural materials science research using powder X-ray diffraction.
BL45XU	**RIKEN Structural Biology I**	(Jul. 1997)	Time-resolved and static structures of non-crystalline biological materials using small-angle scattering and diffraction techniques.

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, the Industrial Application Division was established in 2005. With consultation support for industrial users provided by the division's coordinators, currently, Industrial Application Proposals account for approximately 16%–20% of the total number of proposals conducted at the public beamlines. In addition, the Measurement Service was introduced in 2007B, wherein the personnel of the Industrial Application Division carries out XAFS measurements on behalf of users at BL14B2. SPring-8 also launched a Protein Crystallography Data Collection Service at BL38B1 and a Powder X-ray Diffraction Measurement Service at BL19B2 in 2009B, a Hard X-ray Photoemission Spectroscopy (HAXPES) Measurement Service and a Thin Film Analysis (GIXD/XRR) Measurement Service at BL46XU in 2012B, and a Small Angle Scattering (SAXS) Measurement Service at BL19B2 in 2014B.

In FY2016, JASRI extended the duration of the designation period of the priority field “New Industrial Area Program” for public beamlines, facilitating research and development in new industrial areas toward proposals newly using SPring-8, from the end of 2015B to the end of 2017B.

SPring-8 has consistently provided ~4,000 h of user beamtime per year. Since the start of its operation in 1997, SPring-8 has succeeded in providing a total beamtime of 74,925 h to users. The beamtime available to users, the number of experiments conducted, and the number of user visits at the public and contract beamlines are summarized in Fig. 3. Part of the proposals are for proprietary use, for which refereed reports are not required.

More details can be found at *http://www.spring8.or.jp/en/about_us/spring8data/*.

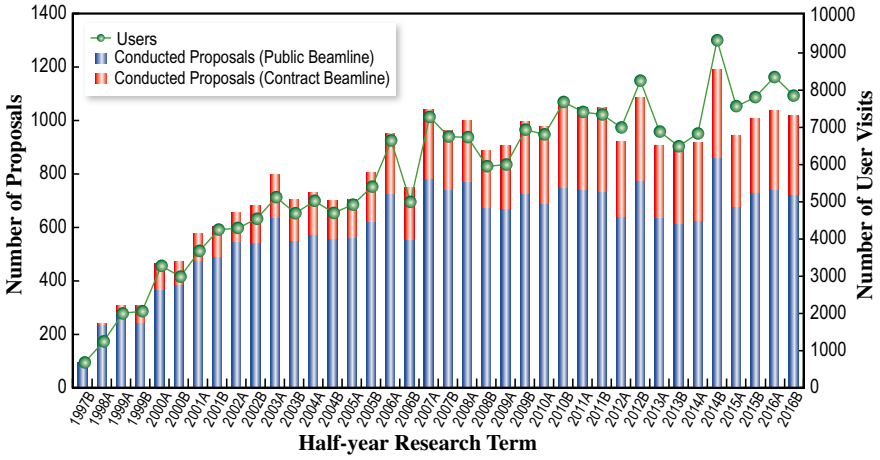


Fig. 3. Numbers of user visits and conducted experiments.

V. Research Outcome

As of March 2017, the total number of registered refereed papers from SPring-8 was 12,743. More details can be found at *https://user.spring8.or.jp/uisearch/publication2/* .

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 FY2016 was 9.6 billion yen. As of October 2016, RIKEN and JASRI had a total of 488 staff members.

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 the University of Hyogo work in close cooperation, forming a research complex where each member has 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 Fig. 4 and Fig. 5, respectively.

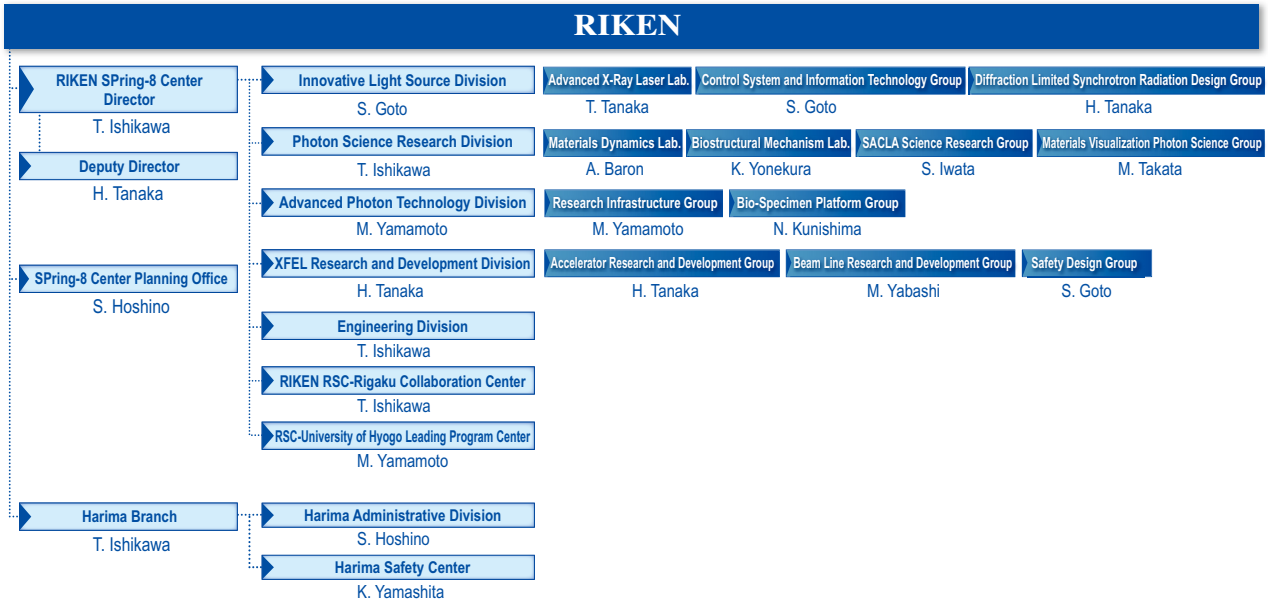


Fig. 4. RIKEN Harima Campus chart as of April 2017.

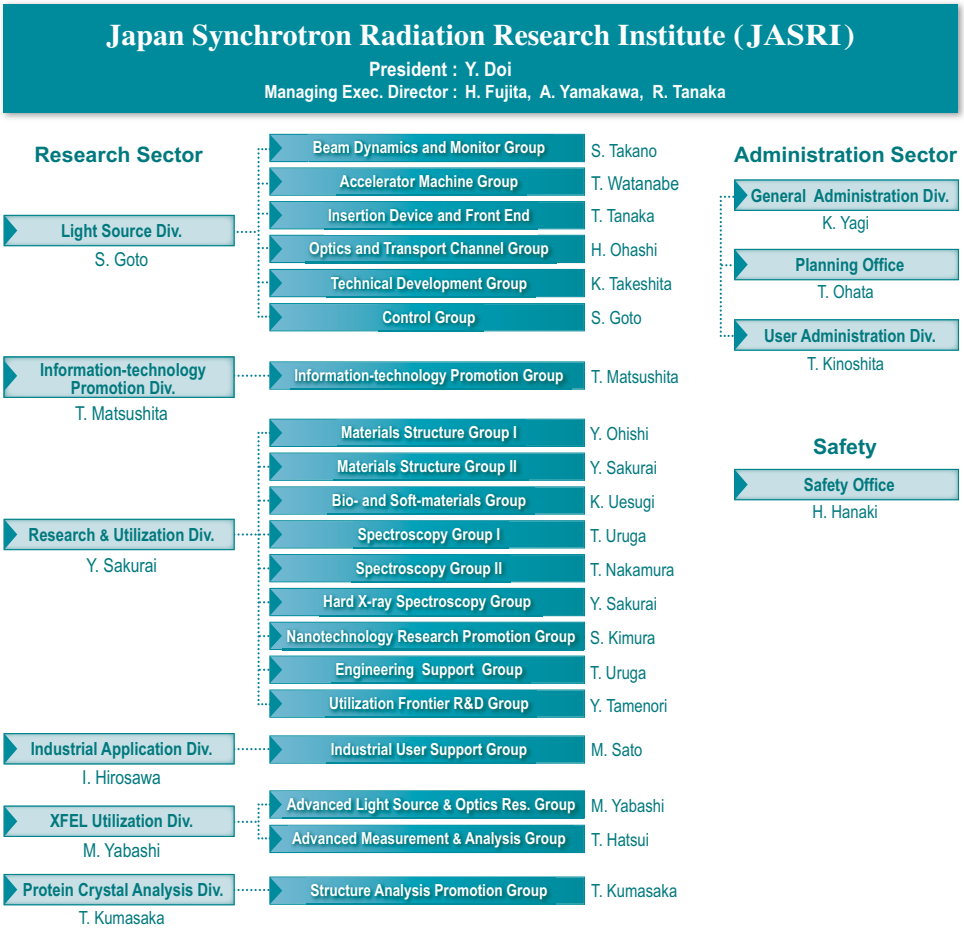


Fig. 5. JASRI chart as of April 2017.

VIII. Users Societies and Other Activities

SPring-8 Users Community (SPRUC)

The SPring-8 Users Community (SPRUC) is a user society that includes not only all users but also potential users who are interested in using SPring-8. In addition to these individuals, representative organizations comprising about 25 institutes (principal universities, national/international research institutes, industries, beamline consortiums) participate in SPRUC to discuss further promotion of the utilization of SPring-8 from strategic and perspective viewpoints.

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 2016, with the theme "Environmental and Energy Issues Addressed by Synchrotron Radiation Research," was held at Kwansei Gakuin University on August 29 and 30, 2016, with 331 participants. SPRUC provides the Young Scientist Award to recognize notable achievements in the development of a new experimental technique or a new method for data analysis, or remarkable results in the studied field obtained by making use of the characteristic features of SPring-8. The award ceremony and award lecture were held at the SPring-8 Symposium. The SPRUC 2016 Young Scientist Award was conferred to two young scientists (Dr. Hideaki Kato, Stanford University, USA, and Dr. Yujiro Hayashi, TOYOTA Central R&D LABS., INC). SPring-8 Symposium 2017 is scheduled to be held on September 4 and 5 at Hiroshima University.

SPRUC has continued to promote the activities of "SPRUC multidisciplinary research groups" in order to develop the use of SPring-8 in the new areas that will be important to future science and technology. Four multidisciplinary research fields were designated in accordance with comprehensive advice from the advisors of the SPRUC research groups in 2014. Two multidisciplinary research groups for nanodevice science and application were launched in 2015, and they made innovative use of SPring-8 through organic collaboration with JASRI and RIKEN this year. The other two groups are now gearing up to start at a different timing from the preceding research groups. In addition, 3rd Term Research Groups actively organized each workshop in FY2016.

In order to discuss medium- and long-term plans for the future performance of detectors and measurement systems, a SPRUC working group on high-performance beamline technologies was launched on December 1, and their 1st meeting was held on December 23, 2016.

Young Scientist Award
Prof. J. Mizuki, Dr. H. Kato, Dr. Y. Hayashi, and Prof. A. Nakagawa

SPring-8 Symposium 2016

Other Activities

To unearth new users in unexplored fields of application, SPring-8 holds various serialized seminars named “Workshop on Advanced Techniques and Applications at SPring-8”. Here are some representatives.

- The new techniques of cultural heritage analysis
  June 4, 2016 • Nara University (Nara)
- Innovation from SPring-8 for the future
  June 7, 2016 • Campus Plaza Kyoto (Kyoto)
- Complementary utilization of Aichi-SR and SPring-8 in the industrial field
  (Co-hosted by Aichi Synchrotron Radiation Center)
  October 25, 2016 • WINK AICHI (Nagoya)
- Present status of advanced measurement techniques at SPring-8 public beamlines
  February 2–3, 2017 • Akihabara UDX (Tokyo)
- Meeting on the next generation advanced device (Co-hosted by Industrial Users Society of SPring-8)
  March 21, 2017 • AP Shinagawa (Tokyo)
- Seminars on complementary utilization of X-ray and neutron: Observation of the internal structure with quantum beams (Co-hosted by Comprehensive Research Organization for Science and Society: CROSS)
  February 17, 2017 • Kenkyusha English Center Building (Tokyo)

SPring-8 Summer School