Central Japan Synchrotron Radiation Research Facility Project

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Introductoin

Synchrotron radiation (SR) facilities have been used successfully for basic researches in the world. However, in the Central Japan area, an SR facility as a tool not only for basic research, but also for engineering and industrial research and development is strongly required. For this purpose, the construction of a new SR facility has been under-constructed in the Central Japan area.

The key equipment of this facility is a compact electron storage ring that is able to supply hard X-rays. The circumference of the storage ring is 72 m with the energy of 1.2 GeV and the natural emittance of 53 nmrad. The configuration is based on four triple bend cells with twelve bending magnets. Four of them are 5 T superconducting ones and the critical energy is 4.8 keV.

Construction Schedule

2010. Buildings construction

2012. First synchrotron light

Top-up operation will be started in near future.

FY2009	FY2010	FY2011	FY2012
Design of the buildings and equipments			
	Const. of the buildings		
Now!	Const. of the accelerators and beamlines		
			Service Start

Management

Aichi Science & Technology Foundation is responsible for the operation and management, and Nagoya University Synchrotron Radiation Reseach Center is responsible to operate the accelerators and support the users technicalluy and scientifically.

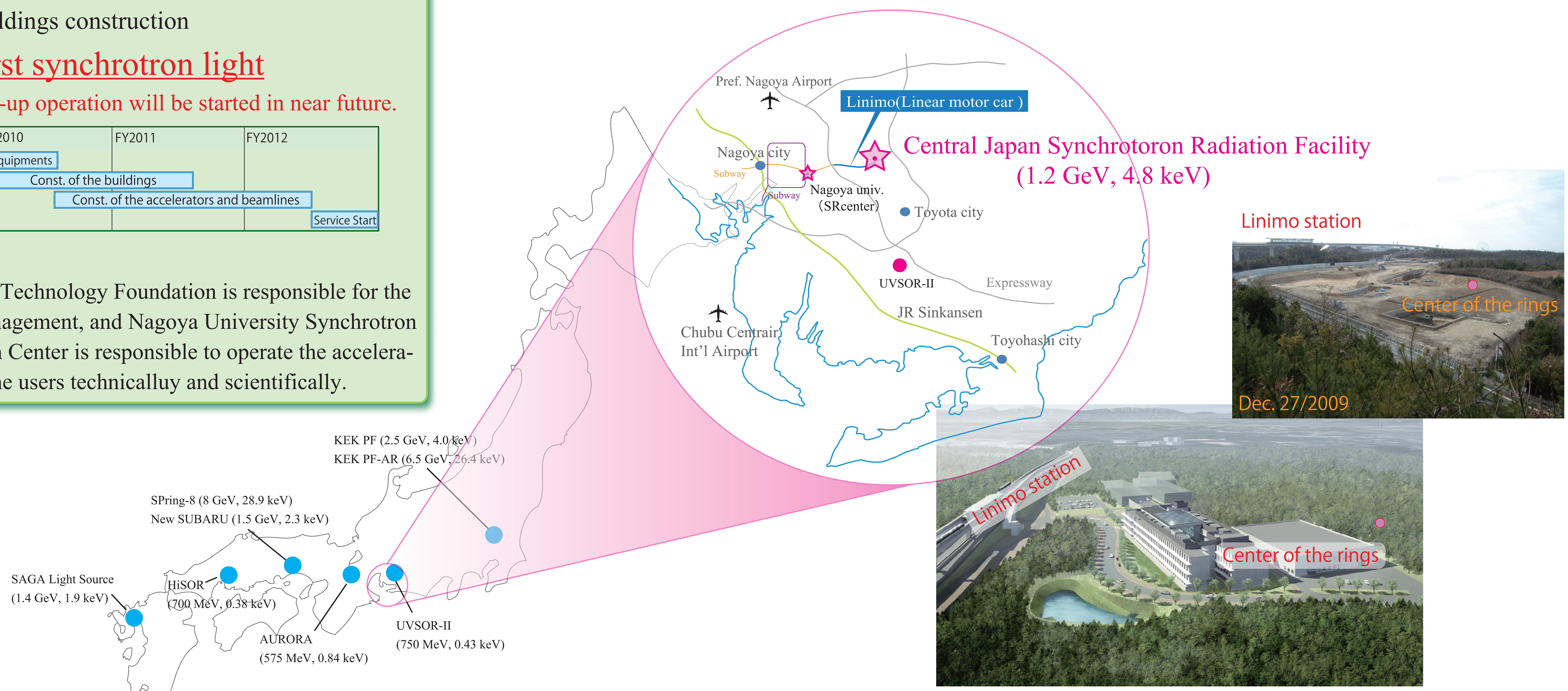

Figure 1. Central Japan Synchrotron Radiation Facility and SR facilities in japan

Beamlines & Accelerators

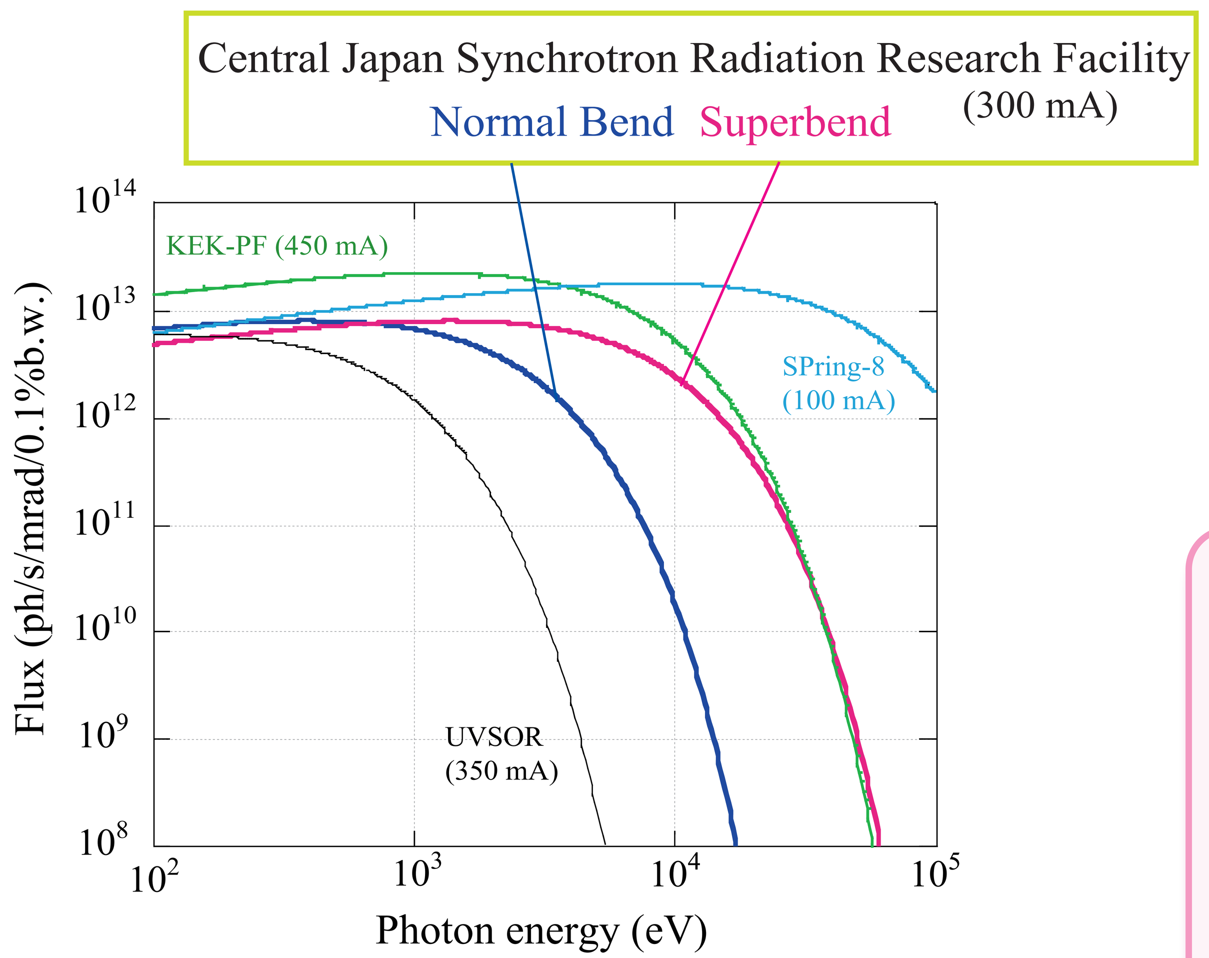

Figure 2. Spectra of photon flux from bending magnets

Table 1. Six beamlines constructed in the first phase

Beamlines	Energy Range (keV)	Flux (photons/sec)	Energy Resolution (E/ΔE)
Hard X-ray XAFS (BL5S1)	5 - 20	1×10^{11}	7,000 @ 12 keV
Soft X-ray XAFS (BL6N1)	0.85 - 6	7×10^{10}	2,000 @ 3 keV
VUV & Photoemission Spectroscopy (BL7U)	0.03 - 0.85	1×10^{13}	10,000 @ 200 eV
Small angle X-ray Scattering (BL8S1)	8.2	7×10^{10}	2,000 @ 8.2 keV
X-ray Diffraction (BL5S2)	5 - 20	1×10^{11}	7,000 @ 12 keV
X-ray Fluorescence & Reflectivity (BL8S2)	5 - 20	1×10^{11}	2,000 @ 12 keV

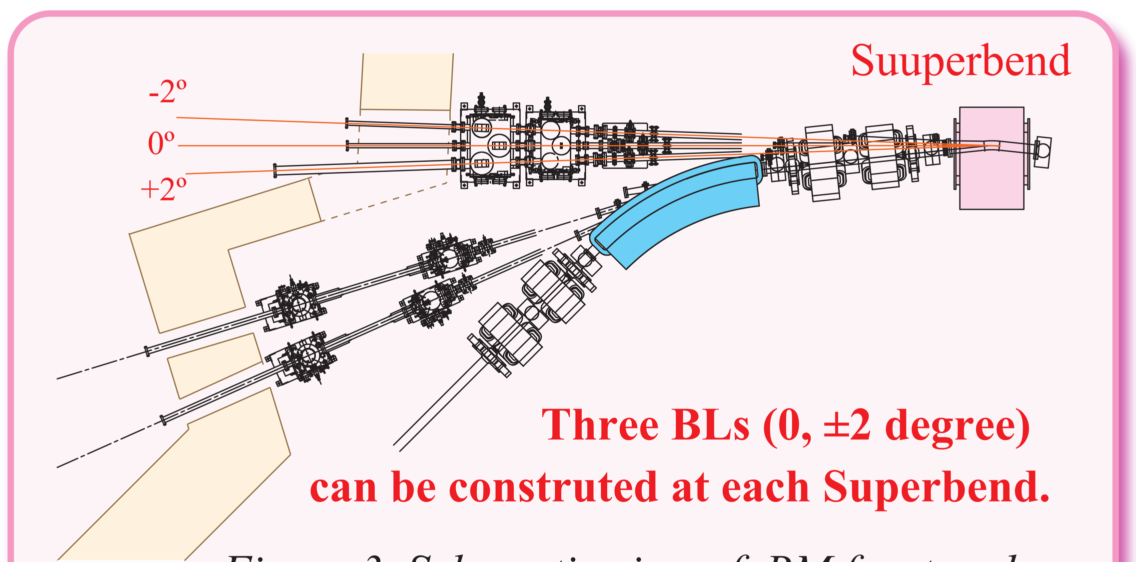

Figure 3. Schematic view of BM front-ends.

Table2. Parameters of Accelerators

Storage Ring	
Beam energy	1.2 GeV
Circumference	72 m
Current	>300 mA
Natural emittance	53 nmrad
Betatron tune	(4.72, 3.23)
RF frequency	500 MHz
RF Voltage	500 kV
RF bucket height	> 0.990 %
Harmonics number	120
Energy spread	8.41 x 10^{-4}
Magnetic lattice	Triple Bend Cell x 4
Normal bend	1.4 T, 39° x 8
Superbend	

Booster synchrotron	
Max. beam energy	1.2 GeV
Circumference	48 m
Current	> 10 mA
RF frequency	500 MHz
Injector linac	
Beam energy	50 MeV
Current	5 ~ 50 mA
Pulse length	5 ~ 100 ns
RF frequency	2,856 MHz

Table 3. Parameters of the Superbend

York type	C type	Length	< 950 mm
Peak field	> 5 T	Hight	< 3000 mm
Bending angle	12° (1.2 GeV)	Width	< 900 mm

For the top-up operation, the electron beam will be injected from a booster synchrotron with the full energy.

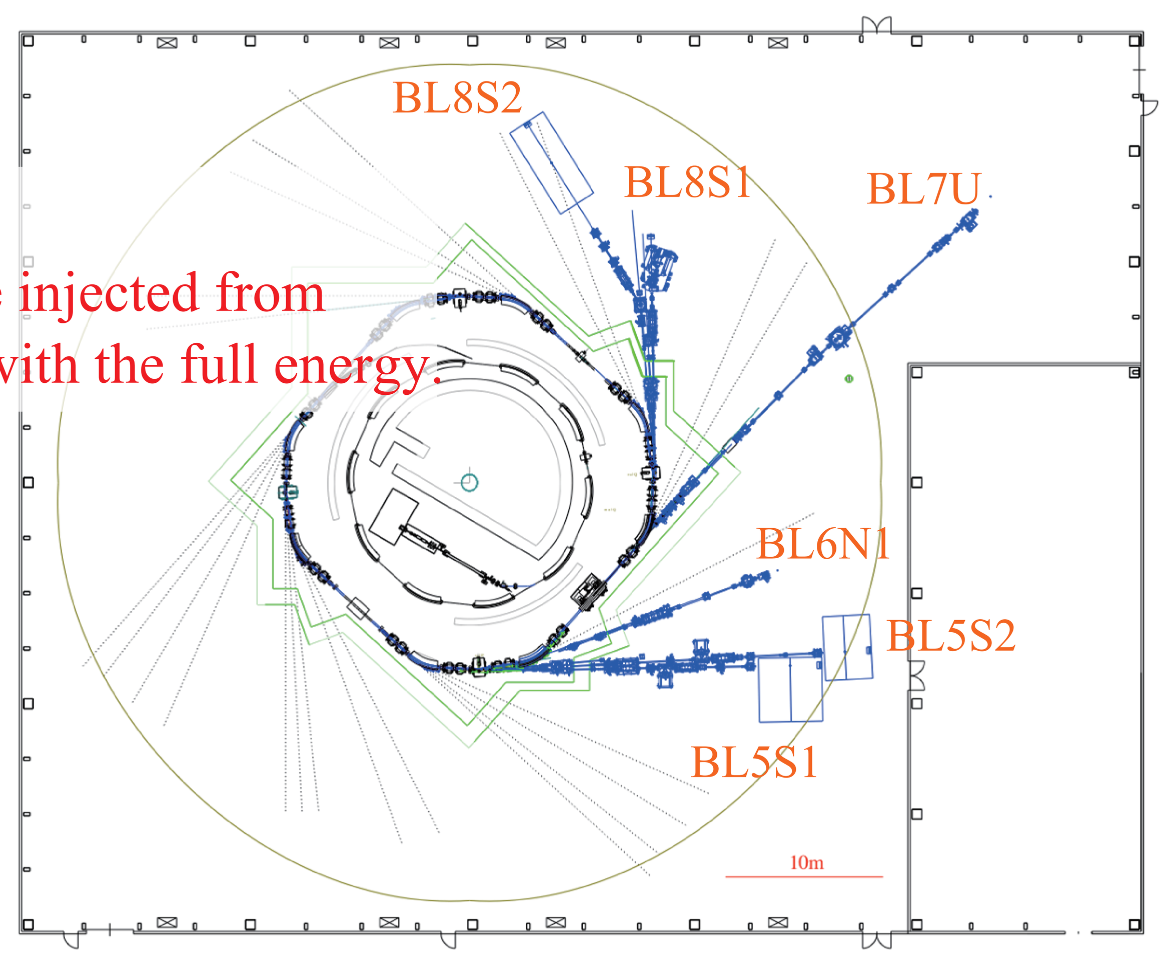

Figure 4. Schematic view of the accelerators & beamlines