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Current Status and Future Plans of Korea-4GSR (Multipurpose Synchrotron Radiation Project)

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KBSI KOREA BASIC SCIENCE INSTITUTE

PAL POHANG ACCELERATOR LABORATORY

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Project Overview

User Activities in Korea

Accelerators in Korea

Heavy Ion radiation-therapy

Korea-4GSR (construction)

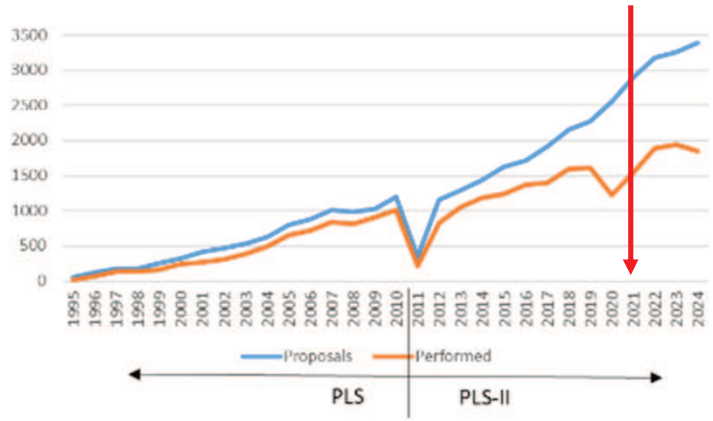
Rare-isotope accelerator

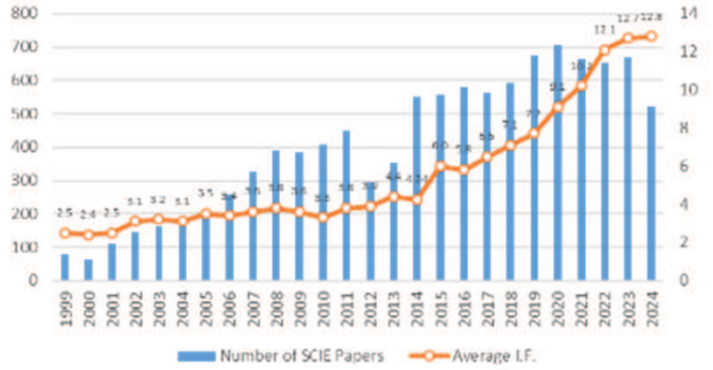
PLS-II & PAL-XFEL

Proton LINAC

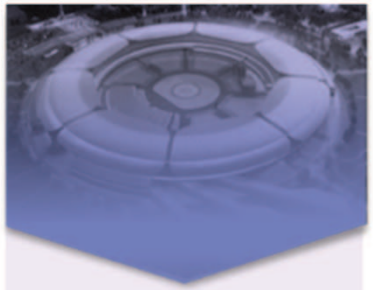
Medical Heavy ion accelerator

Achievements of users and PAL





Overview of the Project



Period & Budget

Period	2021~2029
Budget	1.1643 Trillion KRW = USD 834 M

Land & Building

Land	540,000 m^2
Building	69,959 m^2

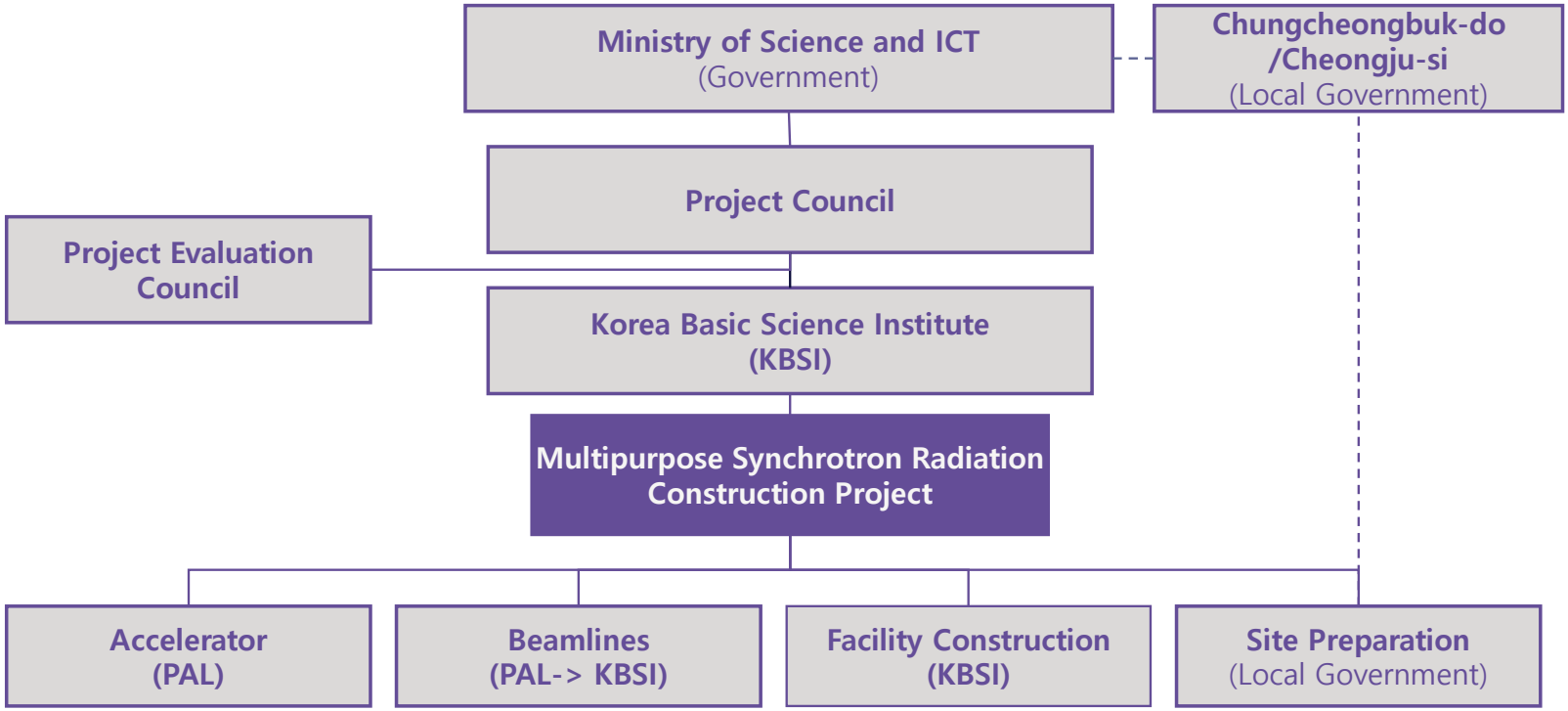
Location

Location	Ochang, Cheongju-si, Chungcheongbuk-do

Characteristics

Beam Energy	4 GeV
Beam Emittance	less than 100 pm·rad (Design: 62 pm·rad)
Circumference	800 m
Beamlines	10 in the first phase (more than 40 in final phase)
Accelerator	Gun, Injector LINAC, 4 GeV Booster and Storage Ring
Lattice	Hybrid 7 Bend Achromat (H7BA)
-	Normal conducting RF cavity and 500 MHz

Project Governance



KBSI, **the leading institute to carry out the project**

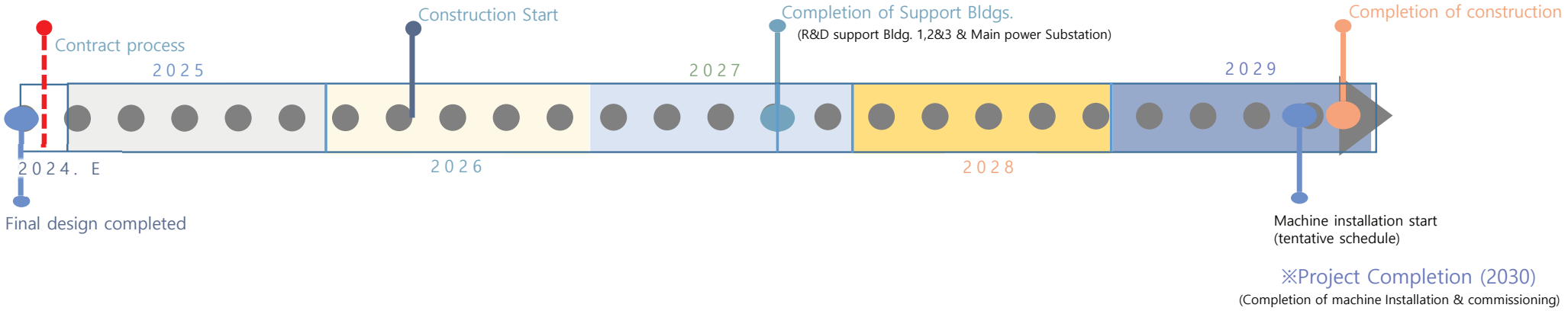
Responsible for **Facility Construction and Project management**

PAL, **the Joint institute as the partner**

Responsible for **Accelerator and Beamline construction**

Project Milestones

1-3. Current status and schedule



※Project Completion (2030)
(Completion of machine Installation & commissioning)

- Key milestones before the construction contract

Activity	Scheduled date	Remarks
4th The tender notice	2025.11	PPS issues a tender notice
Tender notice / site briefing	2025.12	Tender notice for 30days / Guide to contract terms
Technical proposal	2026.3	70 days for proposal preparation
Proposal evaluation and Contract	2026.4	Including contract negotiation

Road Map as User Facility

Vision

World-leading synchrotron radiation for transformative science

- **4 GeV, 400 mA, ε < 100 pm·rad e-beam**
- **Cutting-edge beamlines utilizing unprecedented radiation properties**

Mission

Achieve Design Performance	▪ Complete accelerator & beamline construction ▪ Ensure on-time development and commissioning
Build Operational & Scientific Capability	▪ Accumulate next generation R&D team ▪ **Establish advanced science programs**

Map

2024	2027	2029	2030
Progress without delay	**Project team-driven**	**Commissioning**	**Operation**
▪ Structuring the organization ▪ Project management setup	▪ Development and Inspection ▪ Unified operating system	▪ Assemble and Install on time ▪ Performance verification	▪ Transit to operation mode ▪ Spread into science community

Strategy

Phase 1 (~2030)

Establishing core facility infrastructure

- Collaborative development with KBSI and PAL
- Accelerator development with proven technology
- Co-development of high-demand, user-prioritized beamlines
- Future S&T manpower for operations and Phase 2 expansion

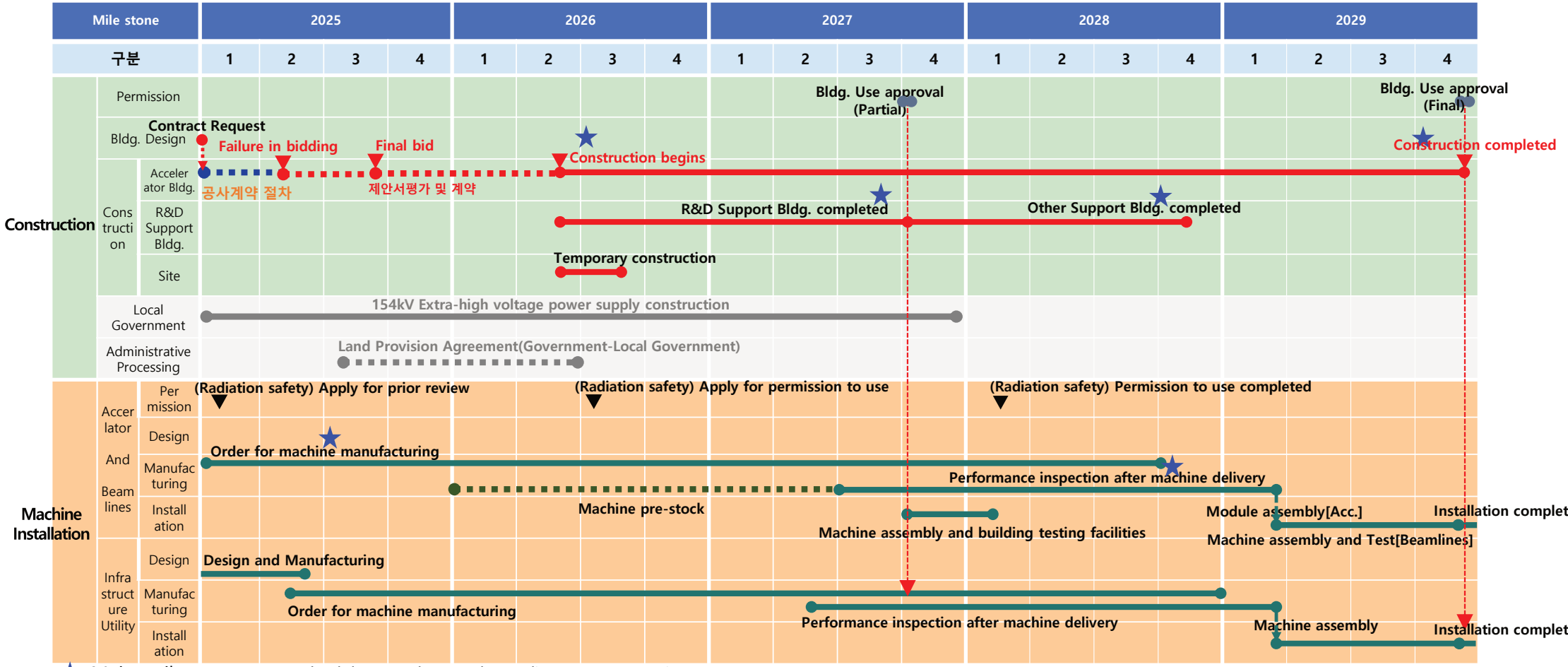
Phase 2 (2031~)

Strengthening research capabilities & infrastructure

- Globally competitive photon science platform through innovation and integration
- Industry-engaged innovation hub
- Integrated science ecosystem
- Science-driven future beamline expansion
- AI-augmented operations for optimization, diagnostics, and autonomous control and means.

1-3. Current status and schedule

Overall schedule

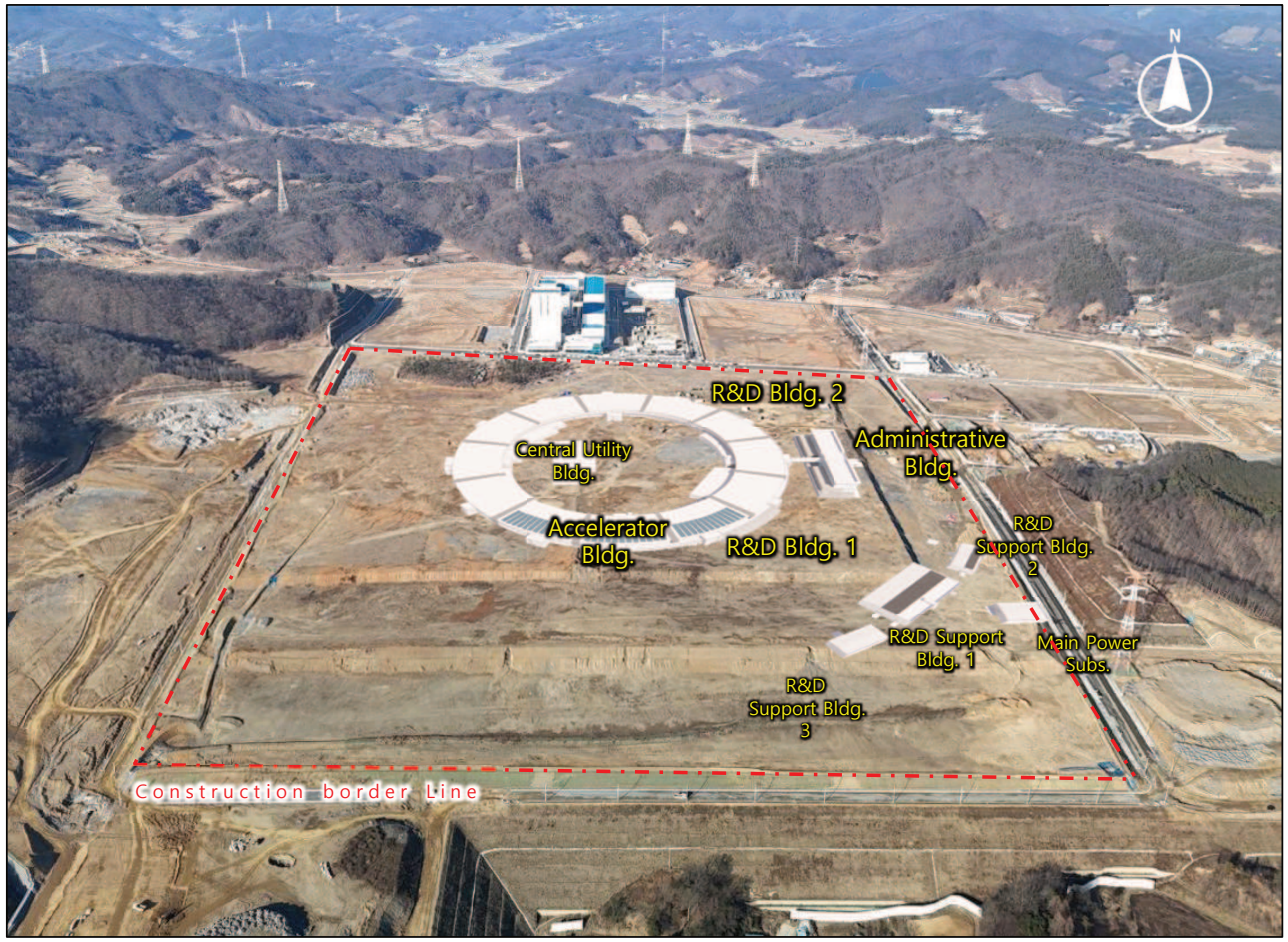


★ Major milestones ※ Schedule may change depending on construction contract

02 Main Design features

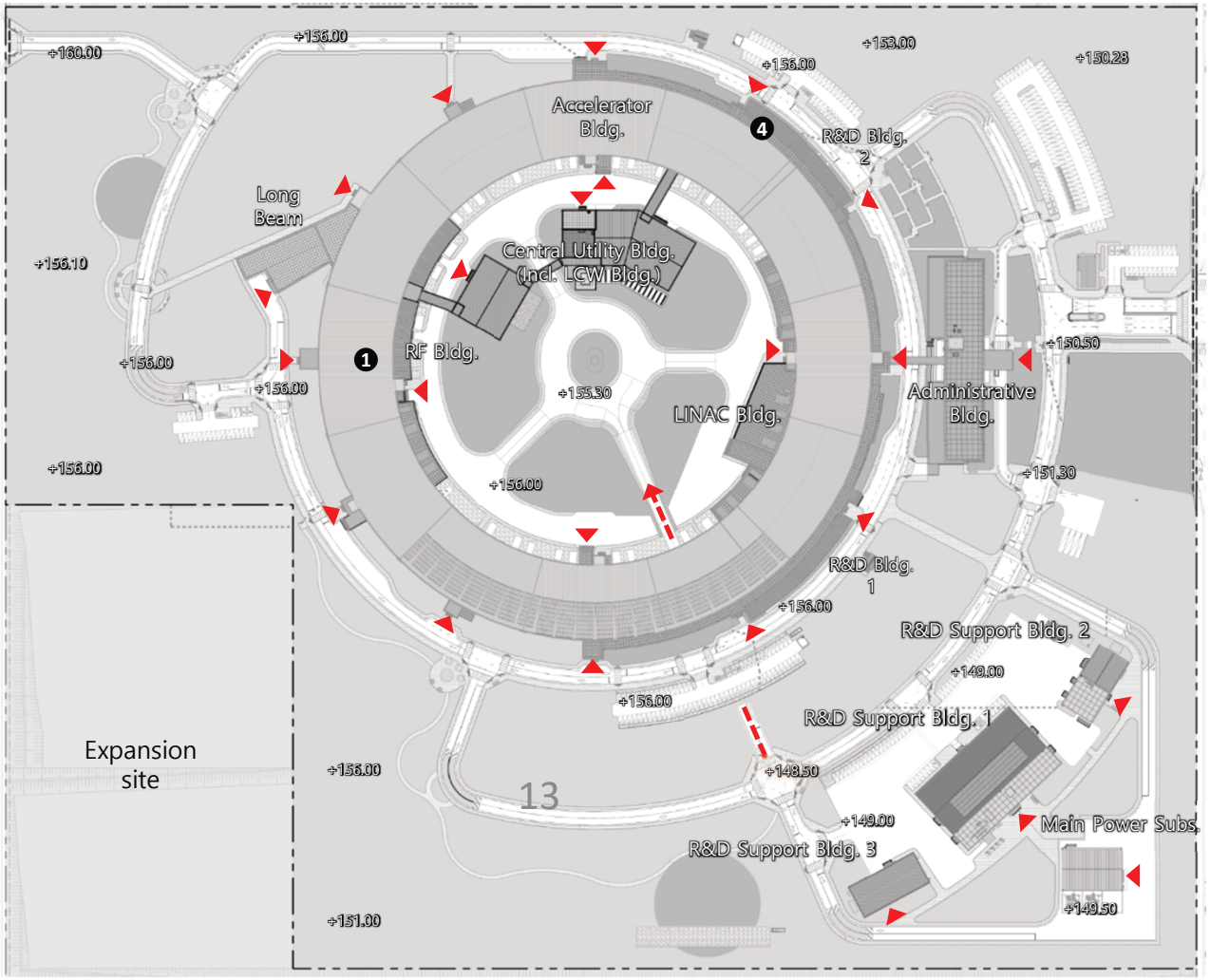
2-1. Architectural Plan

- Bird`s eye view and Picture of site



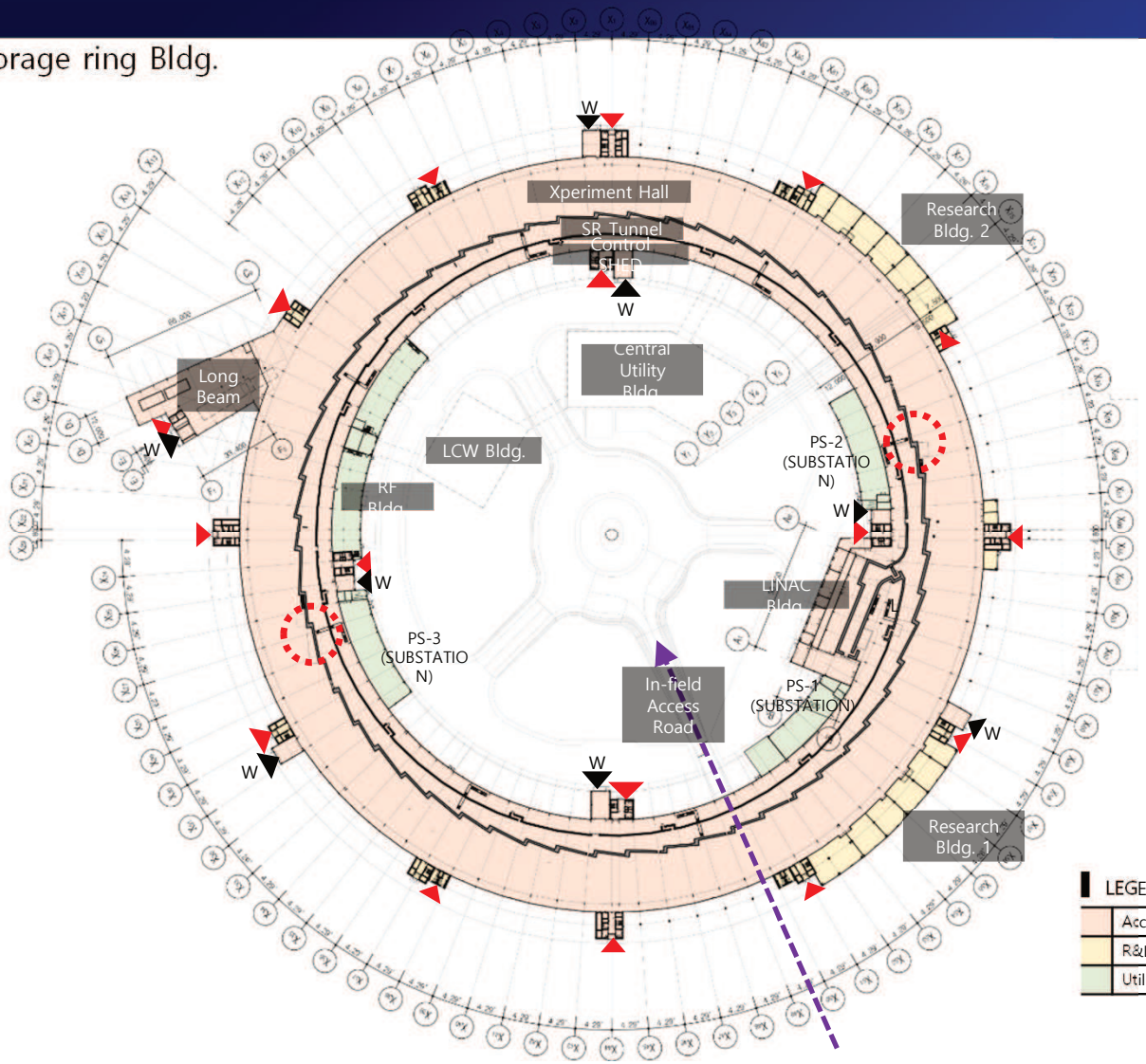
2-1. Architectural Plan

- Master Plan



2-1. Architectural Plan

- 1st Floor Plan of Storage ring Bldg.



In **Research Bldg.**
Chem. Prep. Lab
Bio. Prep. lab
X-ray optical Lab
Electronics develop. Lab
Control research Lab
Mech. vacuum assembly Lab
Data Center
and other Labs

◀ W Equipment Hatch

Movable Block
For the Installation of heavy accelerator machines from E.H.
(Opening size :4.2m x 4m)

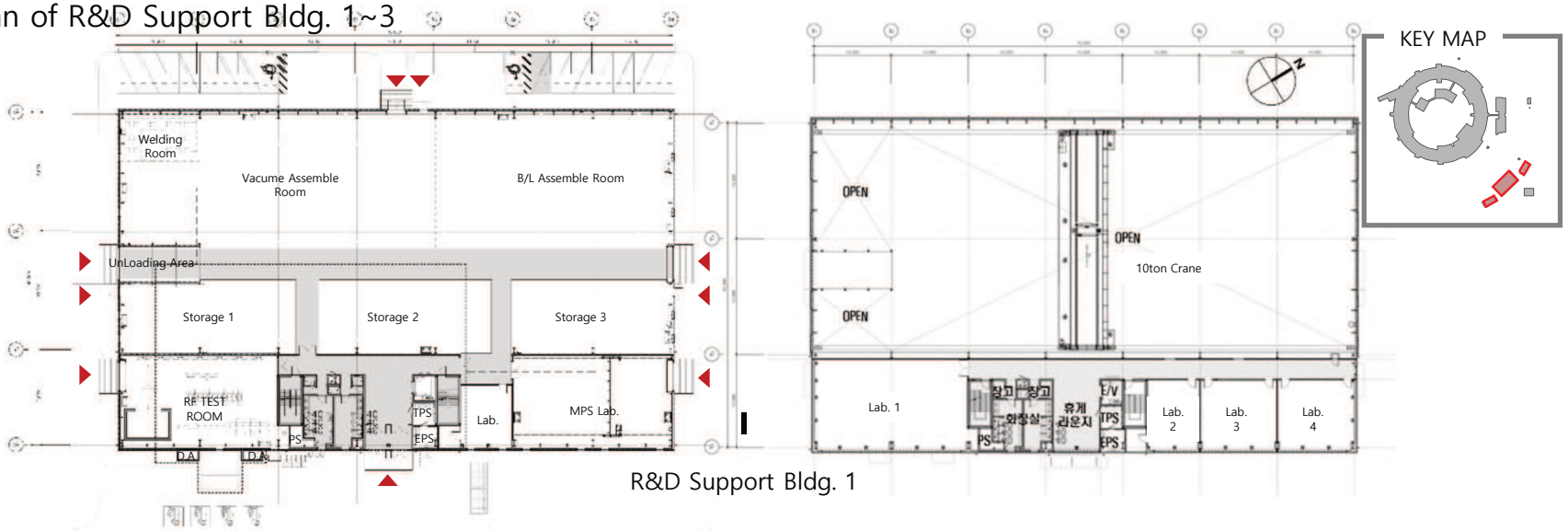
LEGEND
- Accelerator Bldg.
- R&D Bldg.
- Utility Bldg.

▲ : Pedestrian entrance
▲ : Vehicle entrance

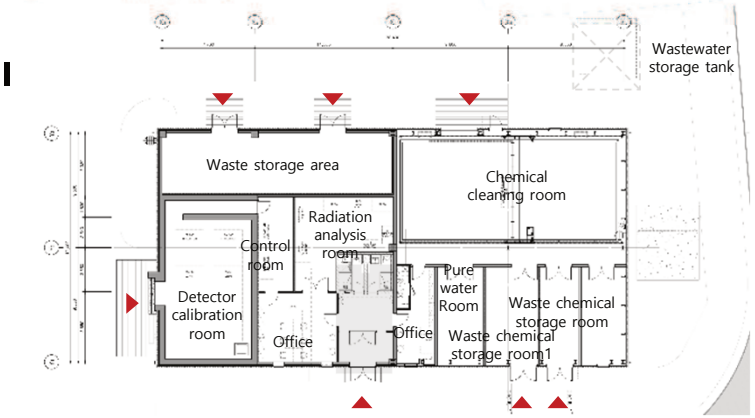
2-1. Architectural Plan

Korea-4GSR
4th Generation Synchrotron Radiation

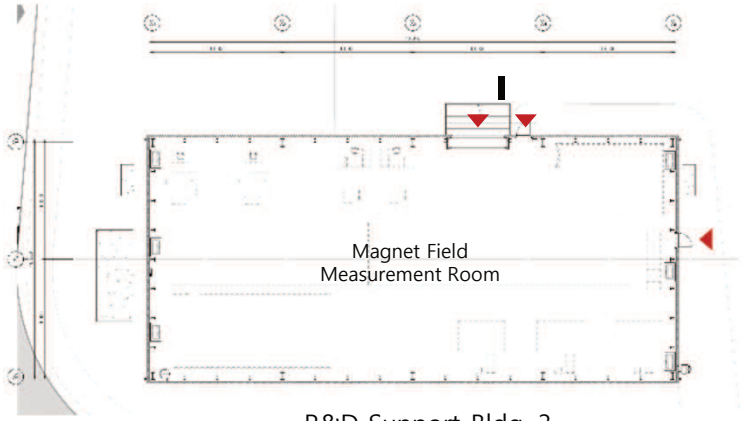
- 1st Floor Plan of R&D Support Bldg. 1~3



R&D Support Bldg. 1



R&D Support Bldg. 2

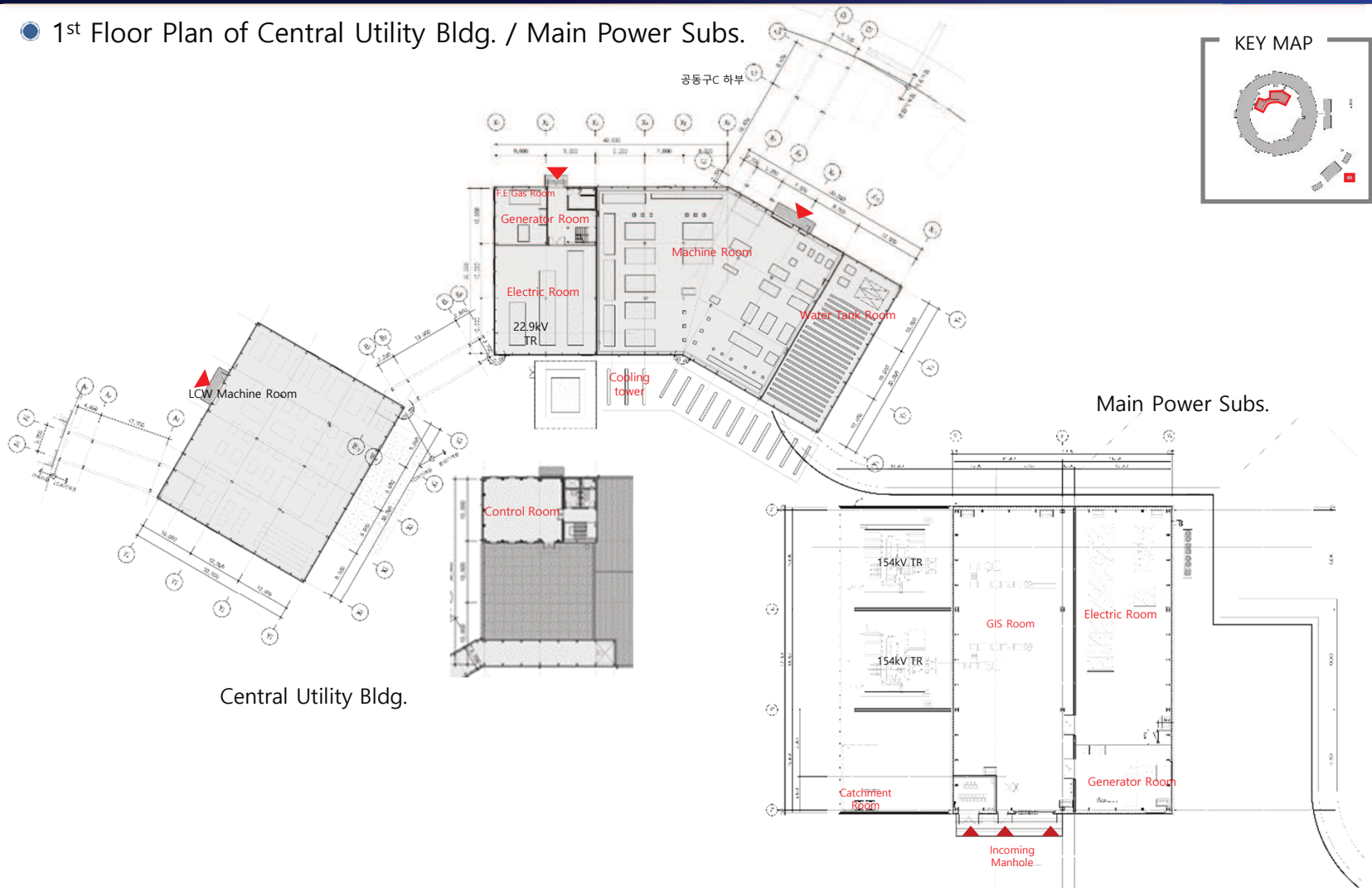


R&D Support Bldg. 3

2-1. Architectural Plan

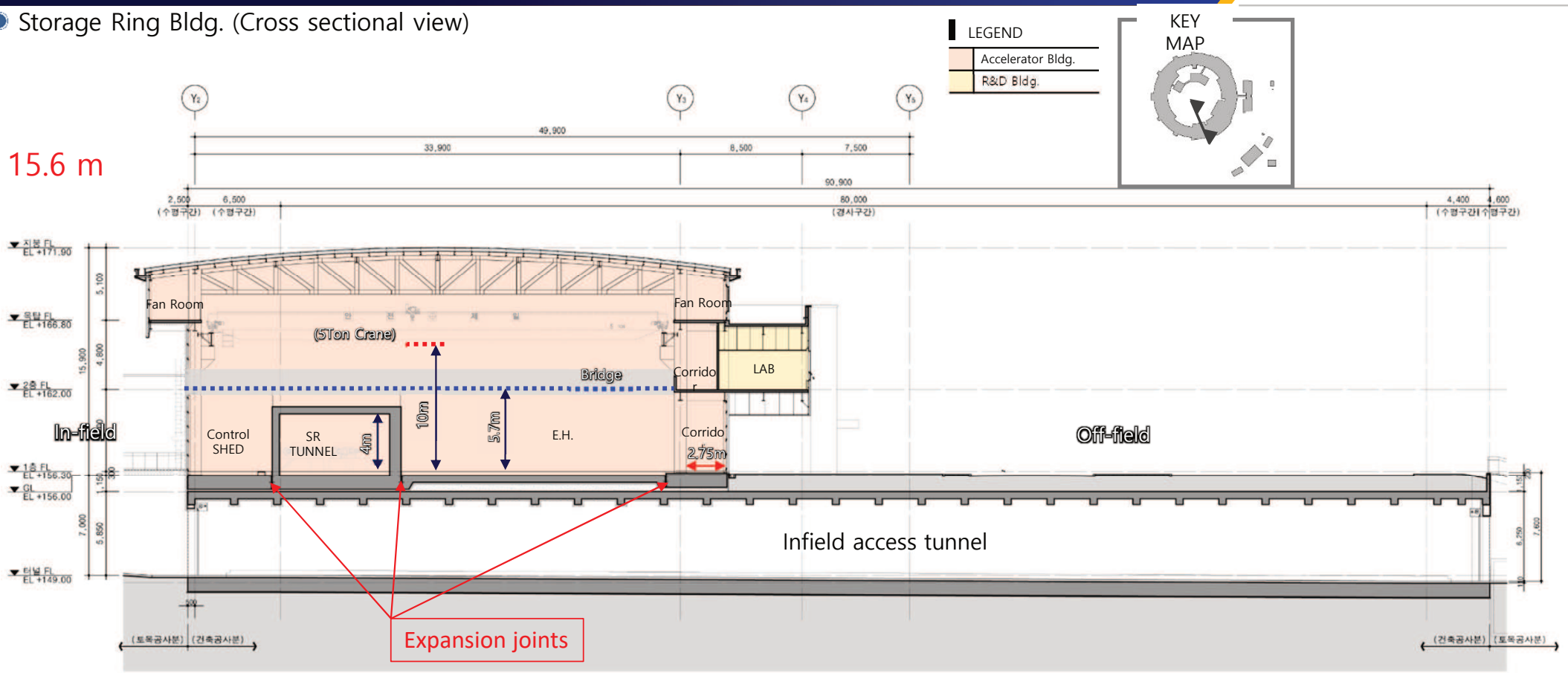
Korea-4GSR
4th Generation Synchrotron Radiation

- 1st Floor Plan of Central Utility Bldg. / Main Power Subs.



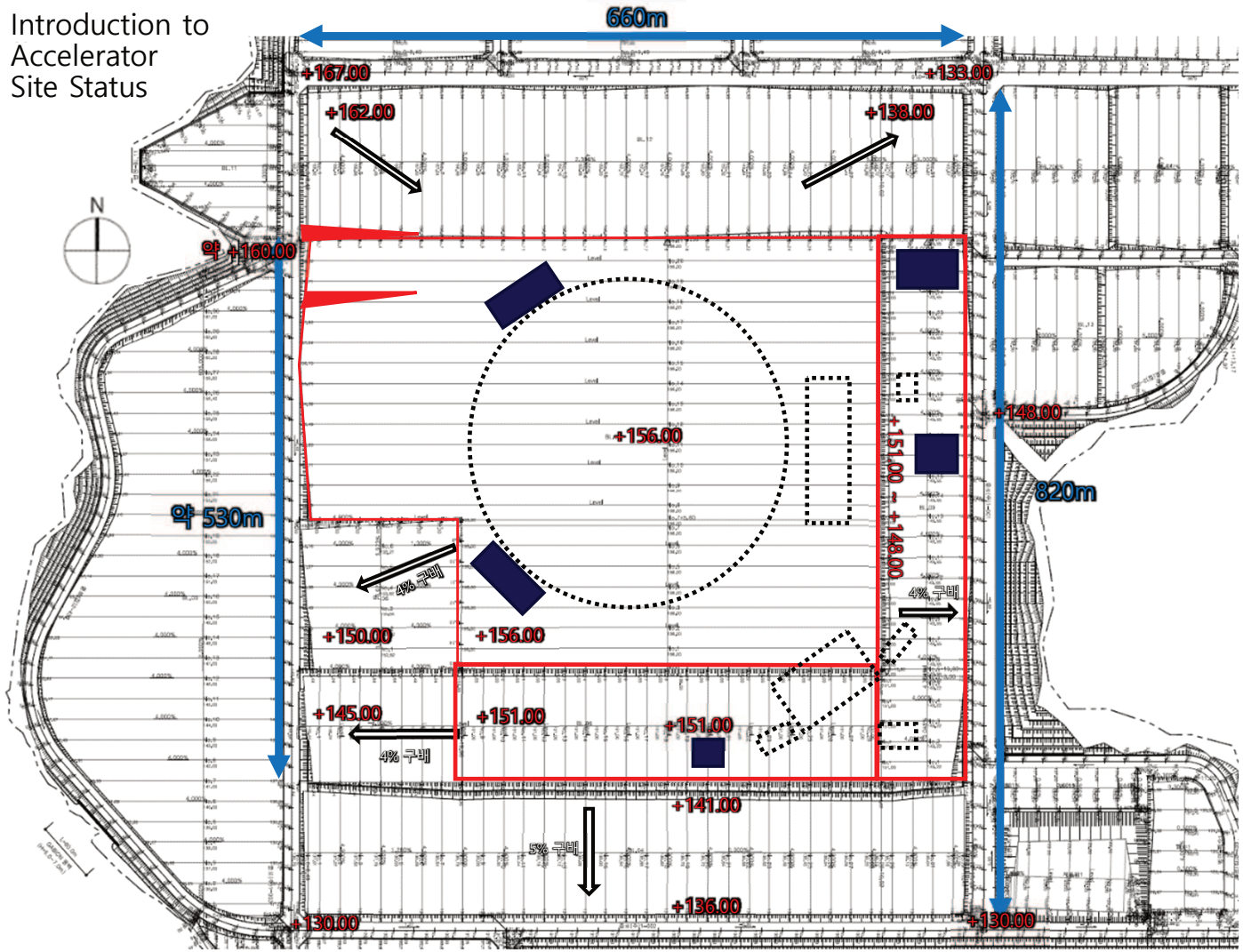
2-1. Architectural Plan

- Storage Ring Bldg. (Cross sectional view)



2-2. Ground work Plan

- Introduction to Accelerator Site Status



Key point

The entire site measures 820m long and 660m wide, and consists of a 310,000㎡ primary site and additional land planned for future expansion

The site features three distinct sections, each with a 5-10m step difference.

Facilities planned for future expansion include the dormitory building, welfare building, R&D support building 4, and research buildings 3 and 4.

KBSI is currently discussing with the government how to utilize additional land, and new ideas are needed.

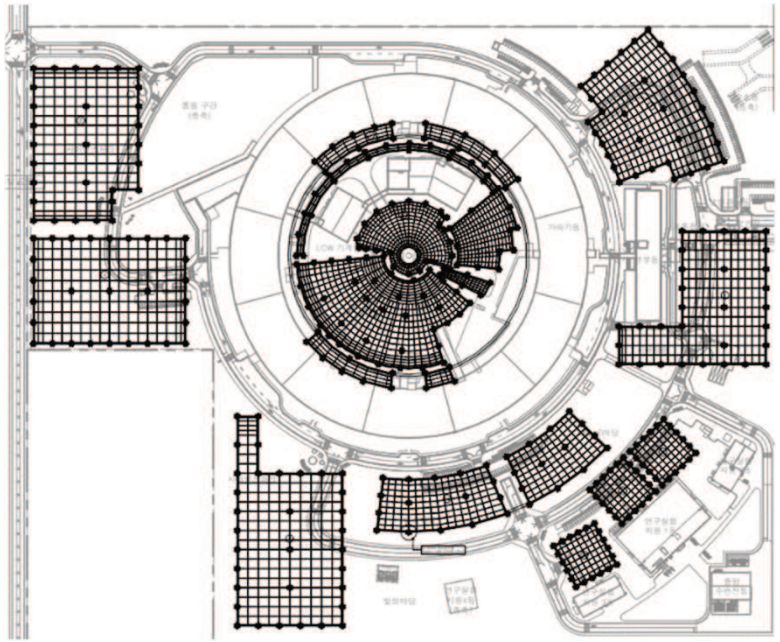
The site was developed with a 4-5% slope toward the outside, focusing on natural drainage.

The accelerator building space, indicated by the circular shape in the center, was developed on the same level.

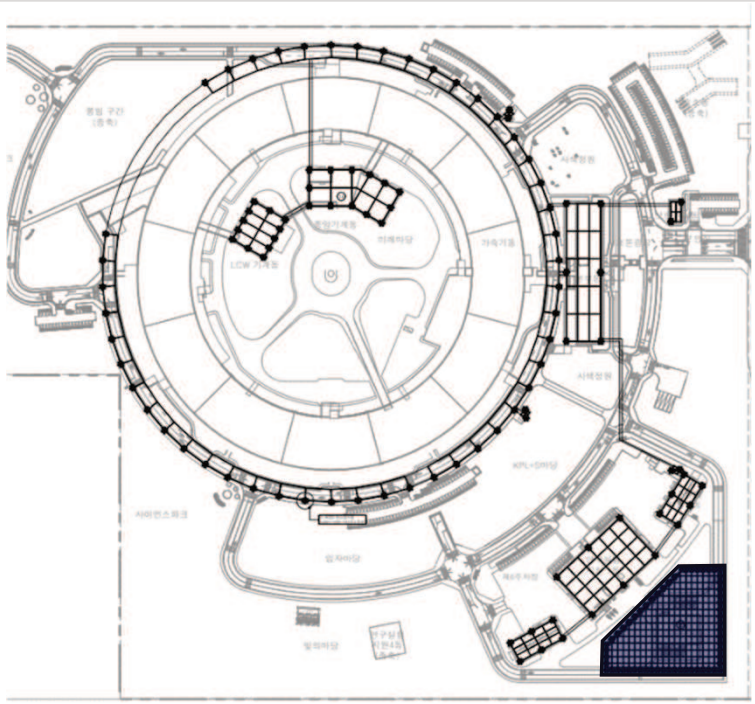
2-3. Other Basic Engineering

- Electrical Design (Machine and building grounding system)

Machine grounding layout



Building grounding layout



주 요 내 용

The grounding system is designed to maintain touch and step voltages within the permissible limits defined by KEC* standards. It consists of a grounding mesh and carbon grounding electrodes.

* KEC: Korea Electro-technical Code

Overview of Korea-4GSR

Korea-4GSR
4th Generation Synchrotron Radiation

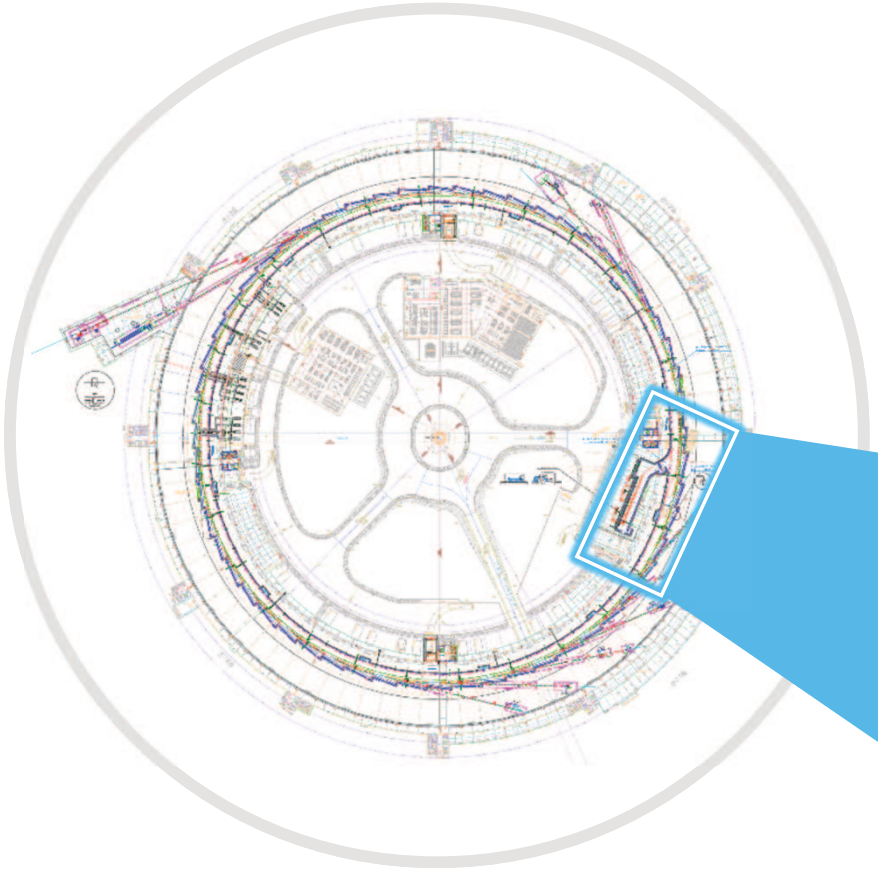
Overview

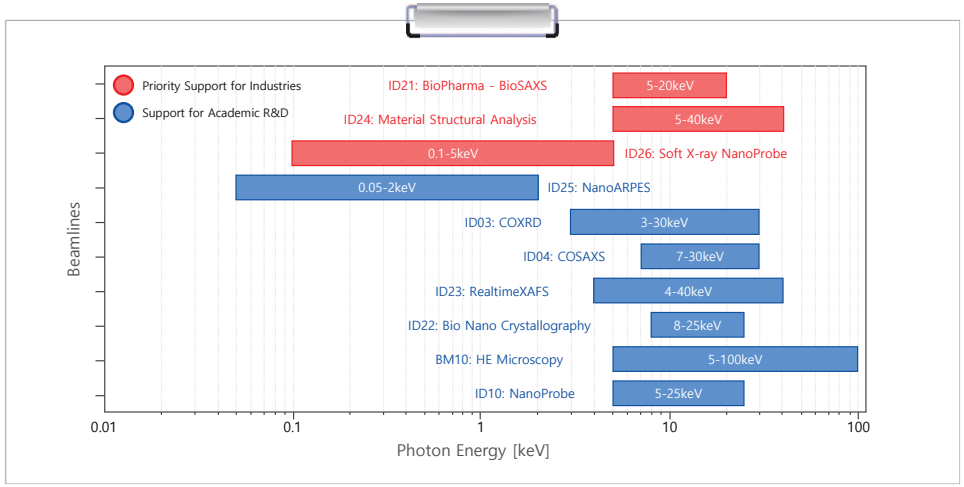
Period	Budget	Land & Building	Location
2021~2029	1.1643 Trillion KRW = USD 834 M	540,000 m2 / 69,959 m2	Ochang, Cheongju-si, Chungcheongbuk-do

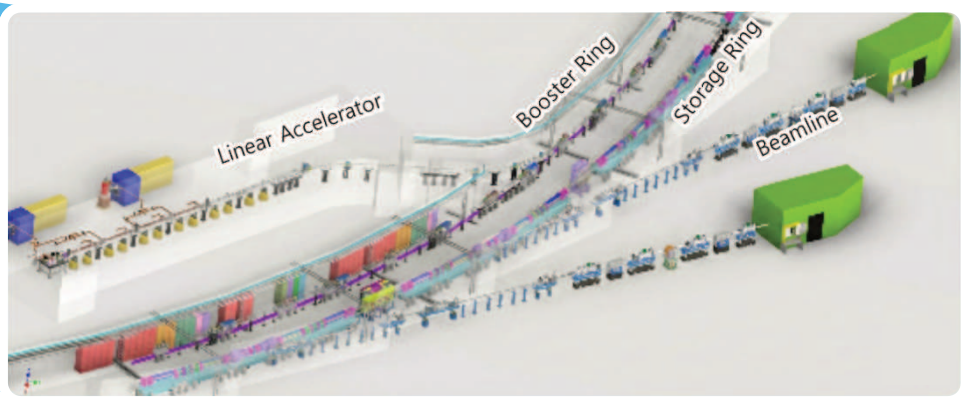
Characteristics

- Beam Energy : 4 GeV
- Beam Emittance : less than 100 pm·rad (Design: 62 pm·rad)
- Circumference : 800m
- Beamlines : 10 in the first phase (more than 40 in final phase)
- Accelerator : Gun, Injector LINAC, 4 GeV Booster and Storage Ring
- Lattice : Hybrid 7 Bend Achromat (H7BA) Normal conducting RF cavity and 500 MHz

Ground Plan for 4GSR







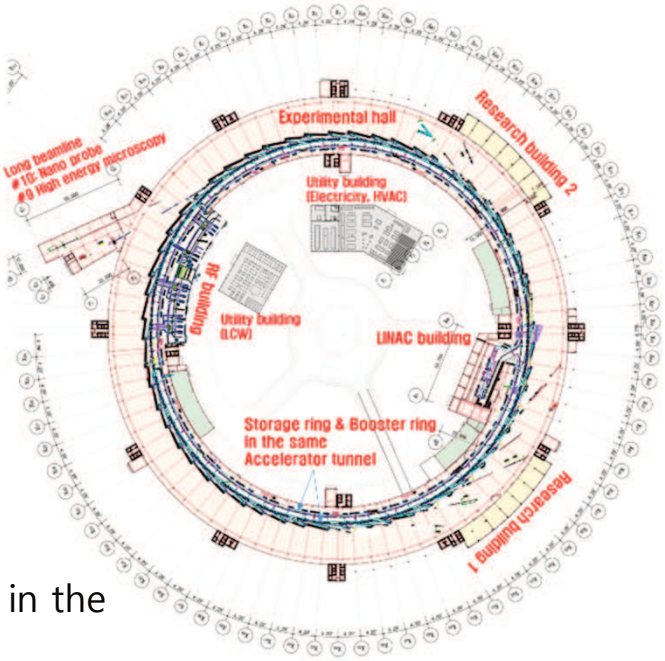
Features of Korea-4GSR

Korea-4GSR
4th Generation Synchrotron Radiation

- **Characteristics of photon beam**
  - Optimal performance in the range of 10 – 30 keV (Still high brilliance @ 1keV)
  - Photon energy up to 100 keV

- **Synergy with PLS-II and PAL-XFEL**
  - Wide coverage of energy spectrum for synchrotron radiation applications in Korea

- **Utilization of validated technologies for the accelerators and beamlines**
  - Booster ring , injected by 200 MeV LINAC
  - Conventional injection scheme, like an off-axis injection with 4 kickers system in the storage ring
  - Comparatively demonstrated technologies for magnets, RF and vacuum systems.
  - On schedule user service and full performance within 3 years from beam commissioning



Phase I Beamlines

Industry Priority Beamline

Public Beamline

ID04 : CoSAXS
8 – 30 keV / IVU20
Coherent SAXS (XPCS)

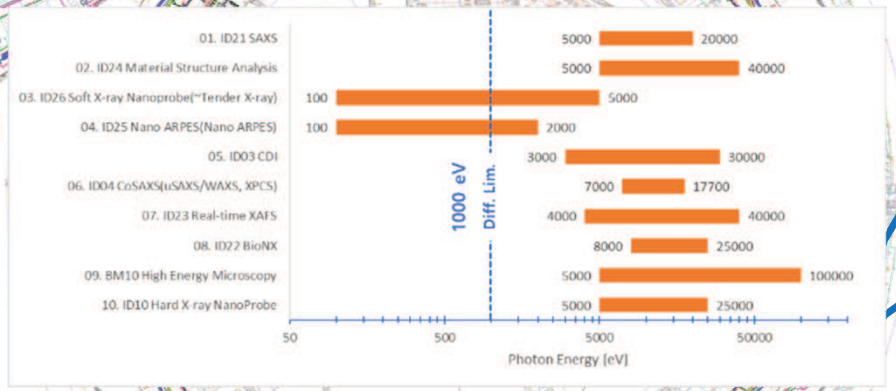
ID03 : CoXRD
5 – 30 keV / IVU22
CDI, Bragg CDI, XRD

ID10 : Hard X-ray Nanoprobe
5 – 25 keV / IVU24
150 m long / nanoscopy

BM10 : High Energy Microscope
20 – 150 keV / BM (H_C = 21 keV)
100 m long / phase-contrast

ID26 : Soft x-ray Nanoscopy
0.1 – 5 keV / EPU78 + IVU24
Soft x-ray spectroscopy

ID25 : Nano ARPES
0.1 – 2 keV / EPU98
Nano-ARPES / μ-ARPES



ID24 : Material Structure
6 – 45 keV / IVU16
Diffraction, HRPD

ID23 : Realtime XAFS
4 – 40 keV / IVU24
XAFS (tr-XANES, EXAFS)

ID22 : Nano MX
5 – 20 keV / IVU20
Molecular Crystallography

ID21 : Bio SAXS
5 – 25 keV / IVU24
Bio / Solution SAXS

Beamline Ports

Total straight Section(SS)	28
Occupied SS for BTL and RF	4
Available ID sections	24
Center band	28
Available ports	52
Beamline of Phase 1	10

10 Beamlines (in the first phase)

Korea-4GSR
4th Generation Synchrotron Radiation

	Beamline	Photon Energy	Resolution	Photon Source	Exp.	Application
Priority support for industries	① BioPharma-BioSAXS	5~25 keV	SAXS: 1 Å 이하 ΔE/E < 10^{-4}	IVU24	① Bio-SAXS	Bio.
	② Material Structure Analysis	5~40 keV	ΔE/E < 10^{-4}	IVU24	① HRPD, XRD ② XAFS	Material Science, Energy material
	③ Soft X-ray Nano-probe	0.1~5.0 keV	sub-micro beam ΔE/E>15×10^{-4}@1keV	EPU78 +IVU24	① XAS ② XPS	Semiconductor, Material Science * Tandem U., Two Branched Beamline
Support for Academic R&D	④ Nanoscale Angle-resolved Photoemission Spectroscopy	0.1~2 keV Optimize: 50 ~200 eV	100 nm < ΔE/E < 10^{-4}	EPU98	① Nano-ARPES	Semiconductor, Material Science *Two Branched Beamline
	⑤ Coherent X-ray Diffraction	3~30 keV	sub-micro beam	IVU22	① XRD ② CDI	Semiconductor, Material Science Geosciences, Chemistry
	⑥ Coherent Small-angle X-ray Scattering	4~40 keV Optimize: 8-17 keV	~ a few nm ~ μm ΔE/E < 2×10^{-4}	IVU20	① SAXS/WAXS (GI 기법 포함) ② XPCS	Material Science, Chemistry
	⑦ Real-time X-ray Absorption Fine Structure	5~40 keV	~ a few μm	IVU24	① XAFS	Material Science, Environments, Geosciences, Chemistry
	⑧ Bio Nano crystallography	5~20 keV	1 Å <	IVU20	① MX	Bio.
	⑨ High Energy Microscopy	5 ~ 100 keV	Spatial R. ~ 0.1μm	Centerbend	① Projection imaging	Material Science, Energy material, Bio * Spatial Resolution : 0.1 μm→0.3-0.5 μm
	⑩ Nano-probe	5~25 keV	~50nm NanoProbe	IVU24	① Ptychography /XRF ② XRS	Semiconductor, Material Science, Geosciences, Chemistry, Environments

Photon Source Specification

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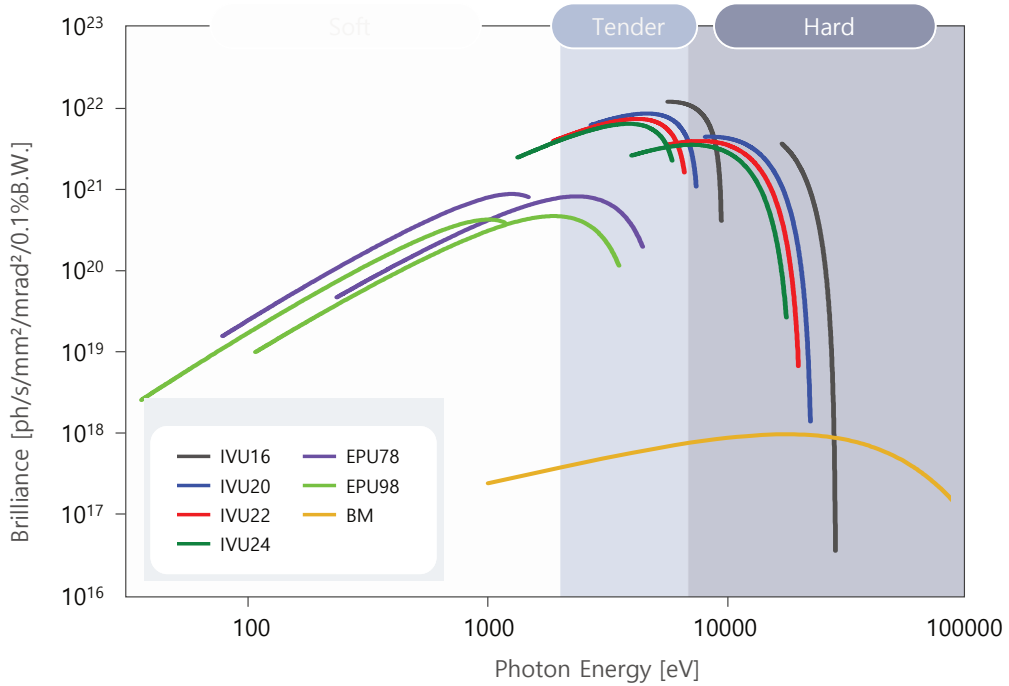
Undulator	(Unit)	IVU16	IVU20	IVU22	IVU24	IVU24	EPU78	EPU98	BM	PLS-II (IVU20)
Beamline #	[mm]	**ID24** Mat. St. Anal.	**ID04** CoSAXS **ID22** BioNX	**ID03** CoXRD(CDI)	**ID10 NanoProbe** **ID21** BioPharma **ID23** RealTime XAFS	**ID26** SX-ray NanoProbe(I)	**ID26** SX-ray NanoProbe(II)	**ID25** NanoAEPES	**BM10**	
Period Length	[mm]	16	20	22	24	24	78	98	-	20
Periods		185	148	134	123	60	23	34	-	68
Device Length	[m]	3	3	3	3	1.5	2	3.62	0.186	1.4
K_{max} value		1.172	1.904	2.315	2.745	2.745	K_V6.948 K_C4.390 K_H5.652	K_V9.238 K_C6.070 K_H8.043	-	1.811
B_{max}	[T]	0.785	1.021	1.127	1.225	1.225	B_V0.954 B_C0.602 B_H0.776	B_V1.010 B_C0.6633 B_H0.879	2	0.969
Gap_{min}	[mm]	5	5	5	5	5	15	15	-	5
ε_{1st}	[eV]	5628.6	2696.1	1876.6	1327.8	1327.8	77.49 [V] / 96.0[C] / 114.84 [H]	35.5 [V] / 40.9 [C] / 46.49 [H]	[E_c] 21280.8	1618.78
Total Power	[kW]	7.38	12.49	15.16	17.93	8.75	6.61 [V] / 5.27 [C] / 4.37 [H]	13.75 [V] / 11.87 [C] / 10.42 [H]	1357.83	2.91
Max.Power Density	[W/mrad^2]	154.3	164.2	165.2	165.4	80.7	24.3 [V]	38.02 [V]	Lin. Pow. Density (kW/mrad) 0.216	22.5
Photon Beam Divergence	[mrad]	$\Sigma_{x'}$ 0.00679 $\Sigma_{y'}$ 0.00626	$\Sigma_{x'}$ 0.00930 $\Sigma_{y'}$ 0.00892	$\Sigma_{x'}$ 0.01100 $\Sigma_{y'}$ 0.01068	$\Sigma_{x'}$ 0.01293 $\Sigma_{y'}$ 0.01265	$\Sigma_{x'}$ 0.01825 $\Sigma_{y'}$ 0.01806	$\Sigma_{x'}$ 0.06684 [V] $\Sigma_{y'}$ 0.06679 [V] $\Sigma_{x'}$ 0.06004 [C] $\Sigma_{y'}$ 0.05998 [C] $\Sigma_{x'}$ 0.05495 [H] $\Sigma_{y'}$ 0.05489 [H]	$\Sigma_{x'}$ 0.07246 [V] $\Sigma_{y'}$ 0.07241 [V] $\Sigma_{x'}$ 0.06745 [C] $\Sigma_{y'}$ 0.06740 [C] $\Sigma_{x'}$ 0.06333 [H] $\Sigma_{y'}$ 0.06327 [H]		$\Sigma_{x'}$ 0.0341 $\Sigma_{y'}$ 0.0171

Beamline Present Status

Brilliance for All Photon Sources, BM, EPU78, EPU98, IVU16, IVU20, IVU22 and IVU24



Beamline Present Status

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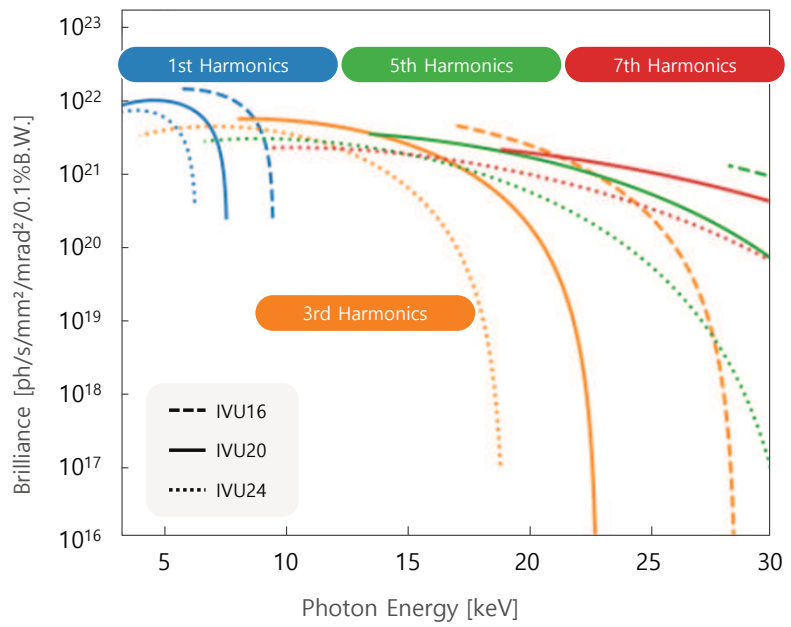
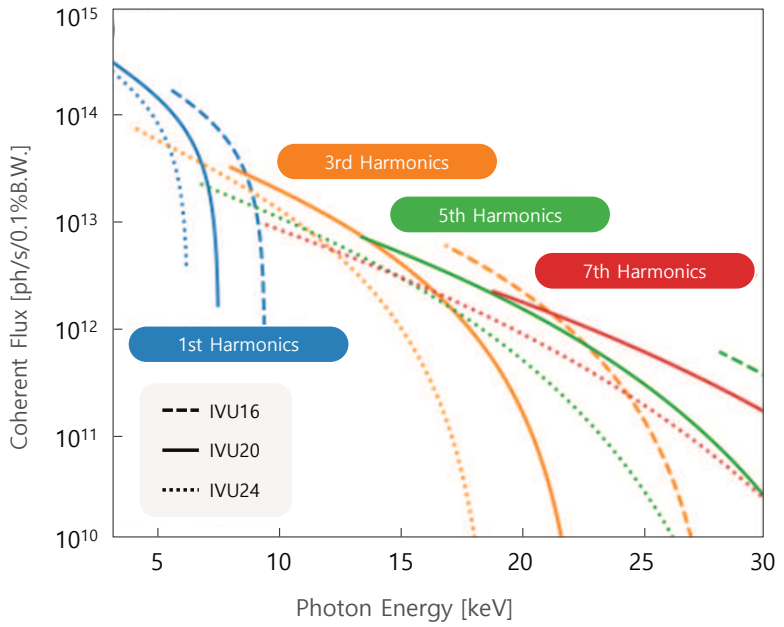
Brilliance and Coherent Flux for IVU16, IVU20 and IVU24

a



b



Bio Science

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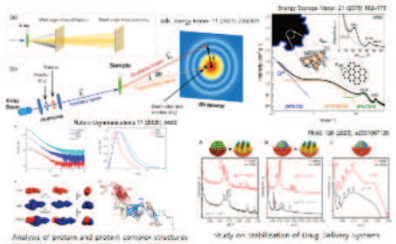
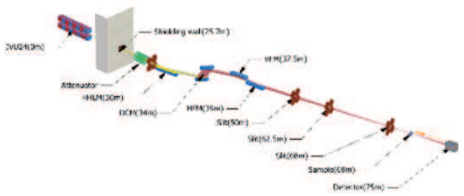
ID21 BioPharma - BioSAXS

Priority to Industries

Study on 3D structural characteristic of biological molecule systems





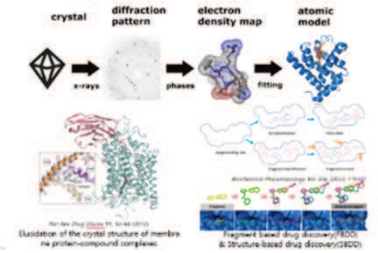
Photon Source	In Vacuum Undulator 24	Beam flux (ph/s)	~ 2 × 10^{13}
Energy Range	5 ~ 20keV (optimized: 8 ~ 25)	Beam size (μm²) H × V, FWHM	34 × 9
Energy resolution	< 2 x 10^{-4}	Spatial resolution	8 ~ 4000 Å

- Introduction of an automatic sample exchange robot to facilitate high-throughput experiments.
- Variable q-range vacuum chamber allows rapid adjustment of sample-to-detector distance within a range of 0.5 m to 6(8) m, enabling efficient analysis of various systems.
- Supporting various sample environments for the structural analysis of biological molecules.

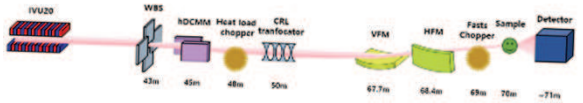
ID22 Bio-NX

Priority to Academic R/D

High-throughput screening for rapid determination of protein-compound structures in drug discovery



Photon Source	In Vacuum Undulator 20
Energy Range (mainly)	8 ~ 25 keV (12.4 and 20)
Energy resolution	< 2 x 10^{-4} (DCM), ~1% (DMM)
Beam flux (ph/s)	> 1 × 10^{14}
Beam size (μm²) H × V, FWHM	2x2 ~ 50x50 @ 12.4 keV 1x1 ~ 5x5 @ 20 keV
Spatial resolution	0.7 Å ~ 3.5 Å
Measurement frequency	> 100Hz



- Provide a minimum beam size of 1 micron and high beam flux, supporting serial and in-situ crystallography experiments. This enhances accessibility to challenging protein crystal samples.
- Supports high-throughput experiments with the introduction of the an automated sample exchange robot.
- Operates a sample preparation laboratory to support drug discovery research, such as fragment library screening

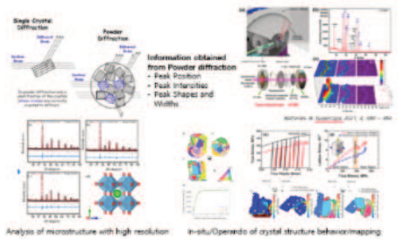
Material Science

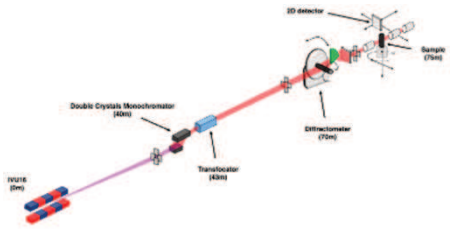
KOREA BASIC SCIENCE INSTITUTE
POHANG ACCELERATOR LABORATORY

ID24 Material Structure Analysis

Priority to Industries

Analysis of microstructure and phase transition of crystalline materials with high resolution





Photon Source	In Vacuum Undulator 16
Energy Range	6 ~ 45keV (optimized: 33.5)
Energy resolution	< 2 x 10^{-4}

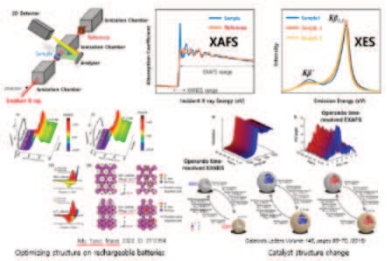
Beam flux (ph/s)	~ 1 × 10^{12}
Beam size (μm²) H × V, FWHM	Natural: 1200 × 600 Focused: 150 x 100

- Delivers a beam with low divergence and low harmonic order, exceeding 20 keV via an insertion device for high-resolution powder diffraction (HRPD) above 30 keV.
- Utilizes HRPD as the primary technique, with an automated sample changer for enhanced efficiency and additional analysis via dedicated experimental setups.
- Supports varied sample environments (temperature, gas, atmosphere) with real-time XRD analysis.

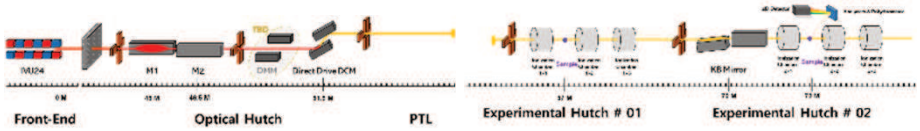
ID23 RealTimeXAFS

Priority to Academic R/D

Studying reaction dynamics on sub-second time scales and states of electrons



Photon Source	In Vacuum Undulator 24	
Energy Range	4 ~ 40keV	
Energy resolution	Si (111): 1.4 x 10^{-4}	Si (311): 3.0 x 10^{-5}
Beam flux (ph/s)	Tuned Undulator: 6.8 × 10^{13} (@10 keV)	Tapered Undulator: 2.4 × 10^{12} (@10 keV)
Beam size (μm²) H × V, FWHM	Focused mode: 10 x 10 μm²	Unfocused mode: 1 x 0.8 mm²
Measurement time	XAS : 1 ~ 20 min Quick XAS : > 1 s XES : a few min	



- By utilizing the IVU24, the ID23 beamline provides advanced spectroscopies, including Quick XAS, operando/in-situ XAS, HERFD-XAS, and XES.
- Such capabilities are expected to support research on both national strategic technologies and fundamental academic science.

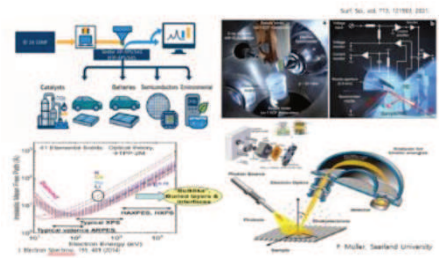
Soft X-ray Science

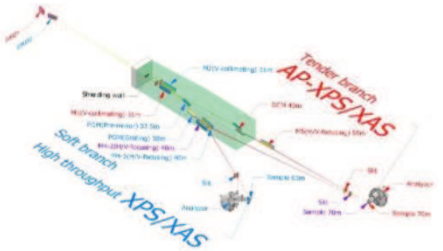
KOREA BASIC SCIENCE INSTITUTE
POHANG ACCELERATOR LABORATORY

ID26 Soft X-ray NanoProbe

Priority to Industries

Probing the electronic structure, chemical states, and nanoscale morphology of materials





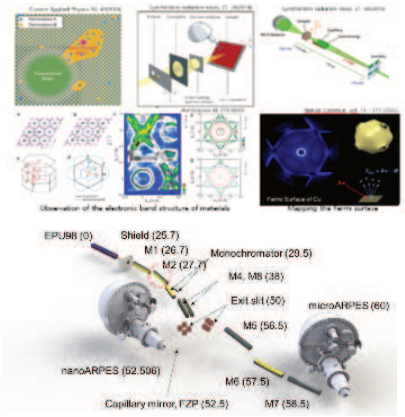
Branch	Tender X-ray	Soft X-ray
Undulator	In Vaccum Undulator 24 (1.5m)	Elliptically Polarizating Undulator 78 (2m)
Energy Range (mainly)	2-5keV	0.1 – 2keV
Energy resolution	< 10^{-4} (at 4 keV)	1 x 10^{-4} ~ 2 x 10^{-4}
Beam flux (ph/s)	~ 1 x 10^{14}	~ 6 × 10^{13}
Beam size (μm²) H × V, FWHM	12 x 5μm²	10 ~ 400μm²

- Canted array undulator (IVU24 + EPU78), Two Branched Beamline
- Energy coverage: 0.1–5 keV (soft → tender X-ray)
- Broad experimental environments
- From ultra-high vacuum to ambient pressure
- Versatile Exp. in (AP)XPS/XAS(in-situ Operando Spectroscopy)

ID25 NanoARPES

Priority to Academic R/D

Mapping of the Fermi surface and observation of the electronic band structure of materials



Branch	Tender X-ray	Soft X-ray
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Beam flux (ph/s)	~ 1 x 10^{14}	~ 6 × 10^{13}
Beam size (μm²) H × V, FWHM	12 x 5μm²	10 ~ 400μm²
ARPES analyzer Energy resolution	< 1.8meV FWHM	< 1.8meV FWHM
ARPES analyzer Acceptance angle	38°	38°

- Enables to observe the electronic band structure, which indicates physical properties, such as electrical, optical and magnetic characteristics.
- From various polarization modes of the undulator, Enables the analysis of magnetic properties and asymmetrical electronic structures
- Operates with two end stations: Micro ARPES(beam size: 5 x 5μm) and Nano-ARPES (beam size : 100 x 100 nm)

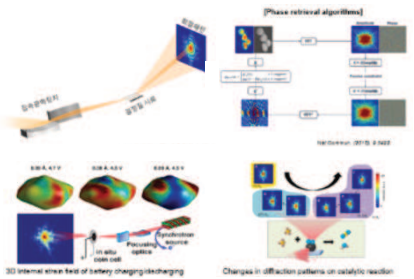
Coherence Science

KOREA BASIC SCIENCE INSTITUTE
PAL POHANG ACCELERATOR LABORATORY

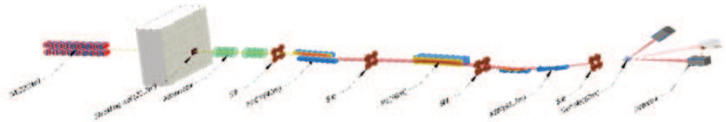
ID03 CoXRD

Priority to Academic R/D

Study on 3D electron density and strain of various samples using coherent X-ray diffraction



Photon Source	In Vacuum Undulator 22 (3m)
Energy Range (mainly)	5 ~ 30keV (6 keV)
Energy resolution	< 2 x 10^{-4}
Beam flux (ph/s)	~ 4.5 × 10^{12} (@ 6keV)
Beam size (μm²) H × V, FWHM	1 μm (KB mirror), 2 - 10 μm (Diamond CRL)
Techniques	CDI, μXRD

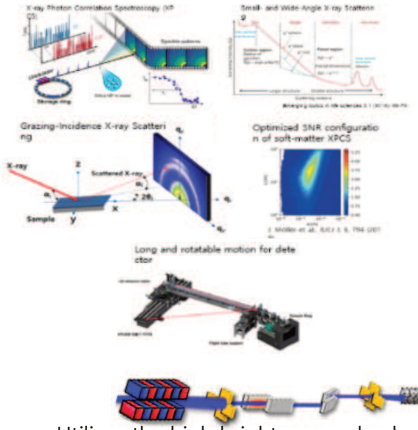


- Utilizing the advantages of the 4th generation storage ring, such as high coherence and small beam size
- Minimize optics, designed to ensure maximum beam coherence up to sample.
- Using Phase retrieval algorithms, the detected diffraction pattern is reconstructed into the 3D image and internal strain field of particle.

ID04 CoSAXS

Priority to Academic R/D

Coherent Small-Angle X-ray Scattering for Dynamics of Soft and Complex Materials



Photon Source	In-Vacuum Undulator 20	
Technique	μSAXS/WAXS	XPCS
Energy Range	8.4 ~ 30keV	8.4 ~ 15 keV
Energy resolution	Si (111): ~ 1 x 10^{-4} Si (311): ~ 3 x 10^{-5}	
Beam flux (ph/s)	~ 10^{13}	~ 10^{11}
Beam size (μm²) H × V, FWHM	8 μm² ~ 100 μm²	5 μm² ~ 100 μm²
Temporal resolution	> 1 msec (In-situ)	sub msec ~ hundreds of sec

- Utilizes the high brightness and coherence of the 4GSR for speckle-based dynamic scattering, with SAXS as the primary method and GI/WAXS as complementary modes.
- Preserves coherence while providing tunable beam sizes and variable detector distances, ensuring flexibility for in-situ/operando studies and scalability for future developments.

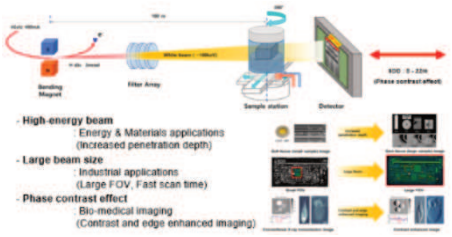
Imaging Science

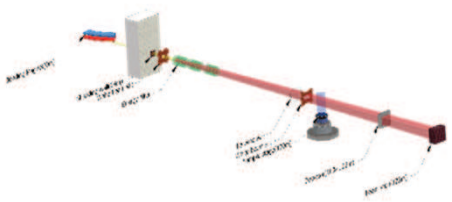
KOREA BASIC SCIENCE INSTITUTE
PAL POHANG ACCELERATOR LABORATORY

Priority to Academic R/D

BM10 High Energy Microscopy

High-quality multiscale 3D image analysis using phase contrast effects





Photon Source	Bending Magnet (2 T)
Energy Range	20 ~ 150 keV (E_c:21.2 keV)
Beam size (FWHM)	200mm x 25mm @ 100 m

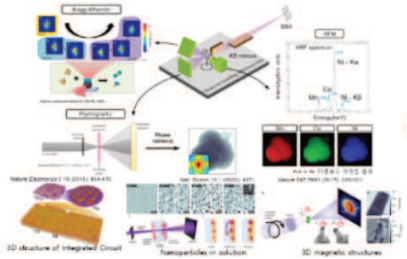
Spatial resolution	> 1.0 um
Technique	Projection imaging
Sample dimensions	H=1.0 m, D=0.3 m (100 kg)

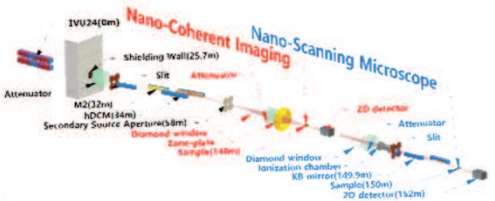
- The high energy microscope beamline is based on projection image utilizing high-energy X-ray beams above 100keV and a long beamline of over 100 meters.
- The bending magnet illuminates the sample at a distance of 100 m with a beam of 200 mm width and 25 mm height, and acquires a high quality projection image by phase contrast effect.
- Phase contrast imaging improves spatial resolution and contrast, allowing researchers to resolve finer structural details in three dimensional imaging and expand the range of observations in materials and biological specimens.

ID10 NanoProbe

Priority to Academic R/D

3D nanoscale quantitative analysis of complex systems





Photon Source	In Vacuum Undulator 24 (3m)
Energy Range (mainly)	5 ~ 25 keV (8 ~ 10)
Energy resolution	< 2 x 10^{-4}

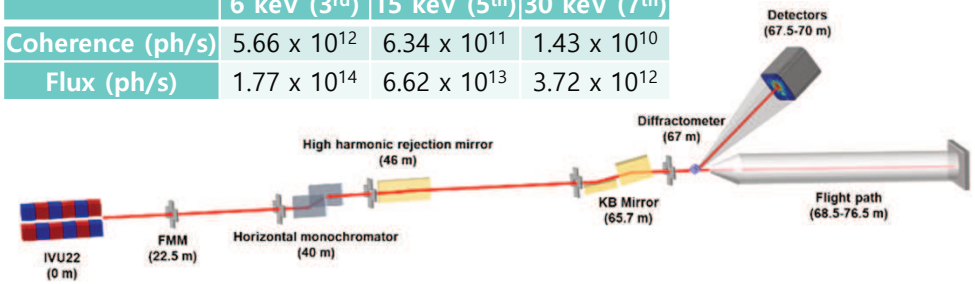
Beam flux (ph/s)	10^9 ~ 10^{12}
Beam size (nm^2) H × V, FWHM	50 x 50
Spatial resolution	< 50nm (Scanning) < 10nm (Imaging)

- Provides high-resolution imaging over a wide area and simultaneous elemental mapping through multimodal analysis using scanning diffraction imaging and X-ray fluorescence microscopy.
- Aims to track reactions and defect growth in systems like batteries and catalysts, enabling quantitative nanoscale analysis of complex functional materials under manufacturing and operational environments.

Feature Beamline - Coherent Beamlines

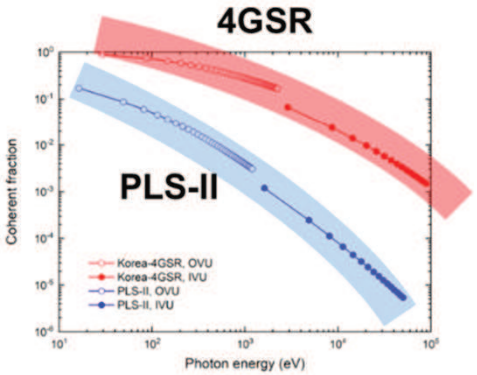
ID03 Coherent XRD

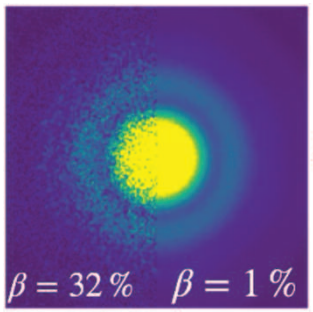
	6 keV (3rd)	15 keV (5th)	30 keV (7th)
Coherence (ph/s)	5.66 x 10^{12}	6.34 x 10^{11}	1.43 x 10^{10}
Flux (ph/s)	1.77 x 10^{14}	6.62 x 10^{13}	3.72 x 10^{12}

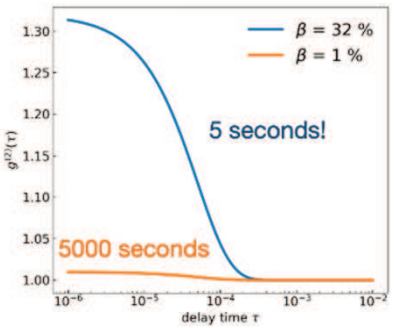


Coherent fraction is enhanced by 100~1000 times better

➔ Direct enhancement of experimental efficiency

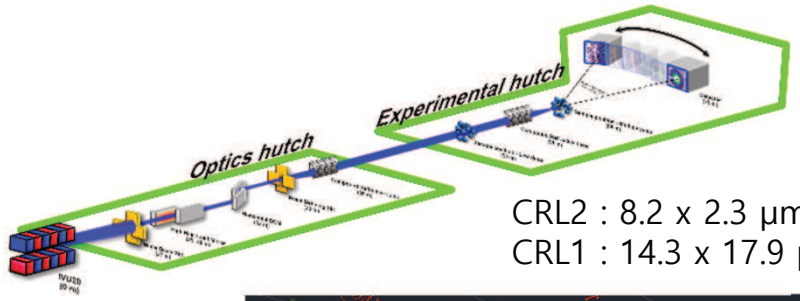






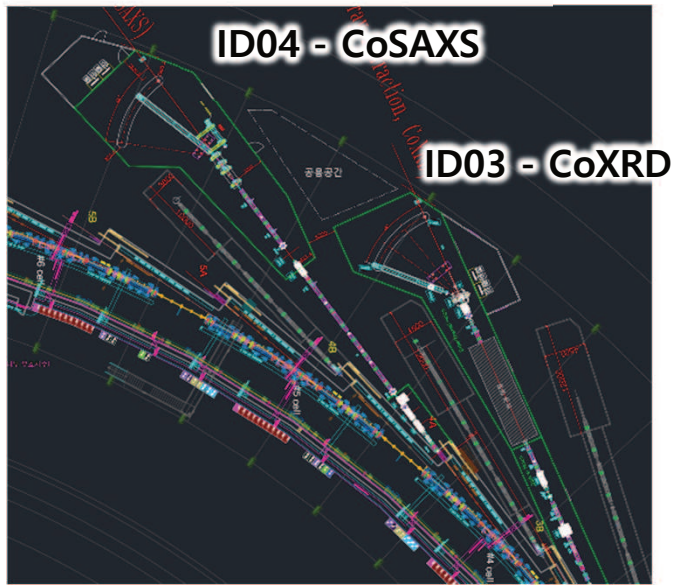
Applied Sciences 11.24 (2021): 11896.

ID04 Coherent SAXS



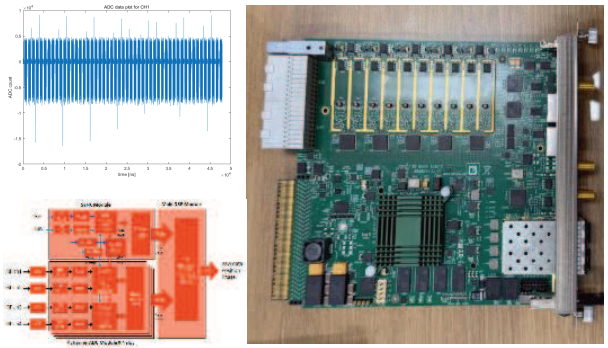
CRL2 : 8.2 x 2.3 μm² @ 20 keV

CRL1 : 14.3 x 17.9 μm² @ 20 keV



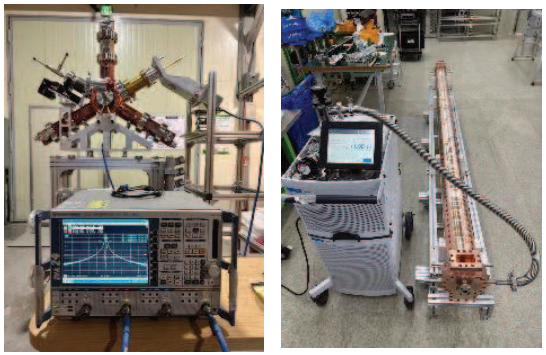
Prototype Development

Electronics

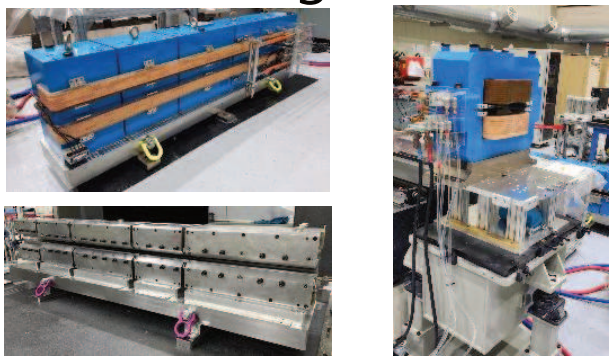


Power Supply

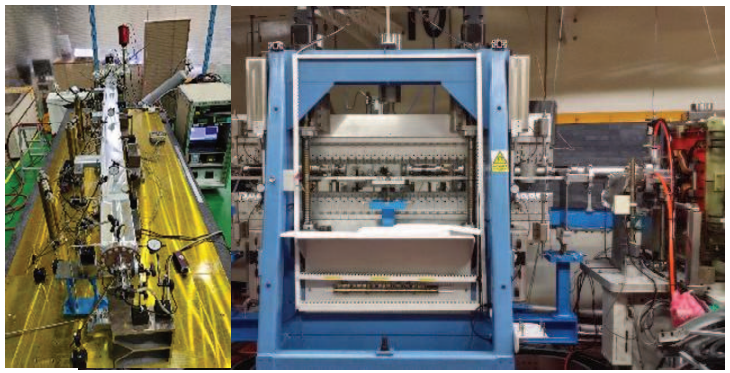
Cavity



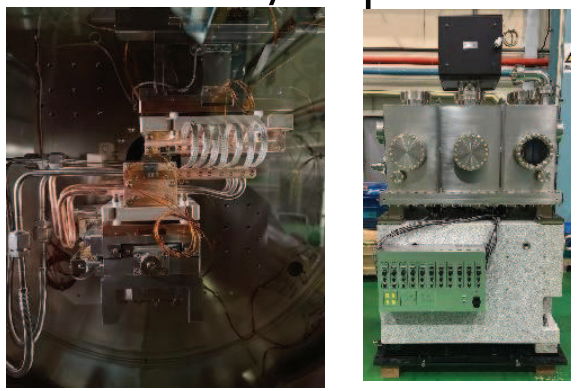
Magnet



Vacuum Chamber



DCM / Optics



CONTENTS

Human Resource Development

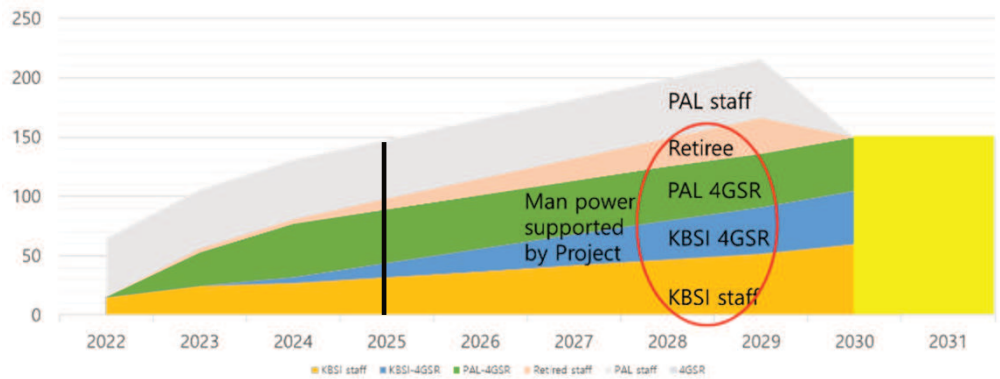
- (Plan) Key Personnel for Construction and Operation
  - Officially 150 Personnel
  - The justification for increasing the workforce to 214 personnel has been established through policy research project

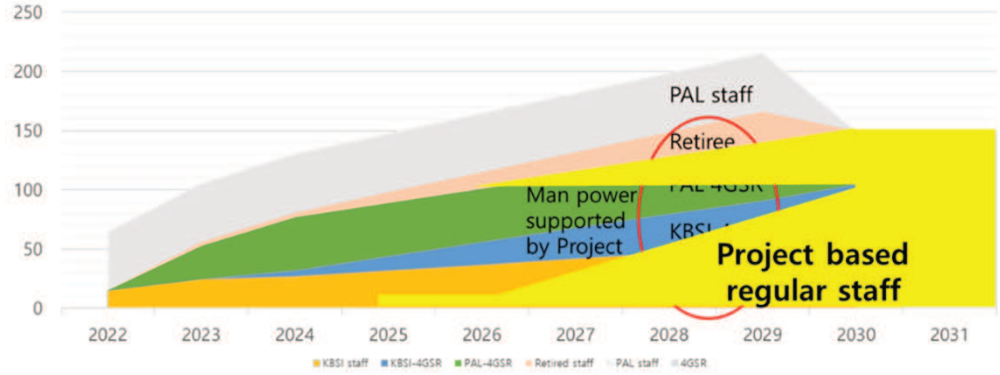
「다목적방사광가속기구축사업 인력운영 기본계획 수립」
최종보고자료

- (Execution) Complex Workforce Structure
  - Progress on unified recruitment
  - Securing and increasing authorized regular positions

2025년 5월 30일

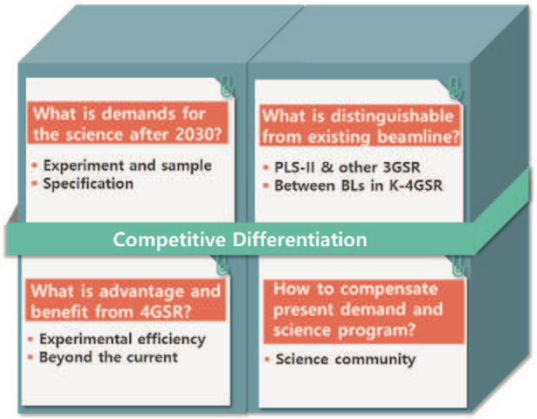
지속경영더원컨설팅(주)





Maximization of Beamline Utilization

- Start of Regular Discussions: Science Workshop and SAC (with sub working group)
- Expected Outcome Management (> 100+ papers IF>10) with User Expansion
- Strengthening Data Science and AI capabilities (Initiation of a Separate Study)



조사보고서

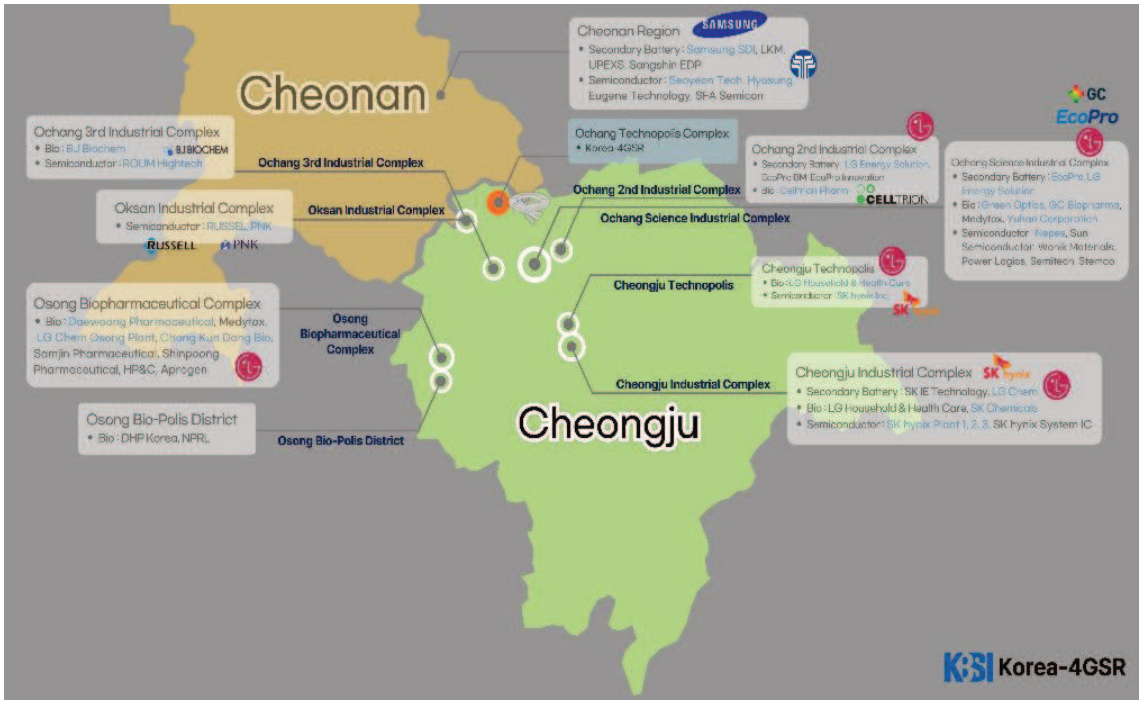
AI/AX 적용을 통한 4GSR 다목적 방사광가속기 활용 강화 대응 전략

* Data workflow
* Physical AI Integrated Autonomous Experimental System
* Science Foundation model
…

2025. 10.

Industry Support

- Region with Numerous Industries Including Leading Companies
- Plan for Discovering Industrial Users and Establishing a Support System for Industrial Experiments and Analyses



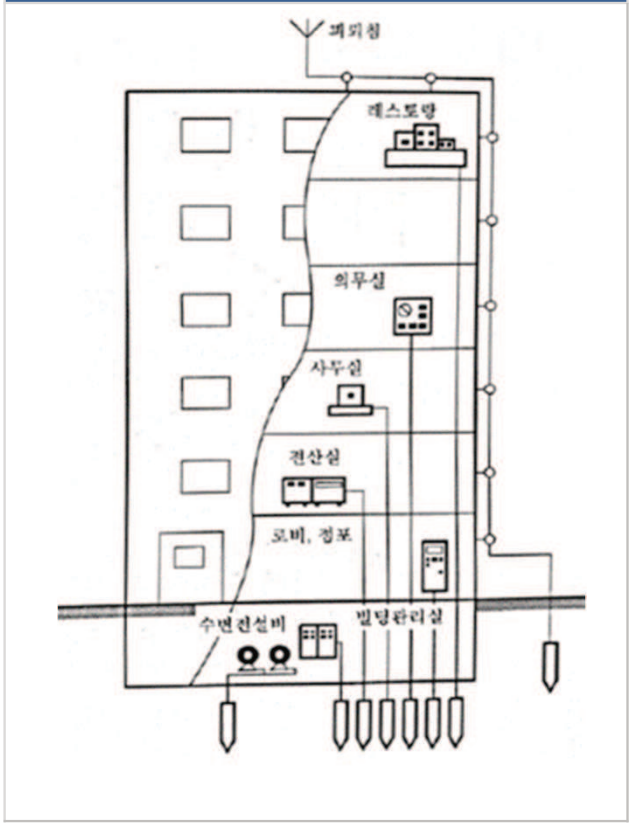
Thank you for your attention!

KBSI 한국기초과학지원연구원 KOREA BASIC SCIENCE INSTITUTE
PAL 포항가속기연구소 POHANG ACCELERATOR LABORATORY
다목적방사광가속기 구축사업단

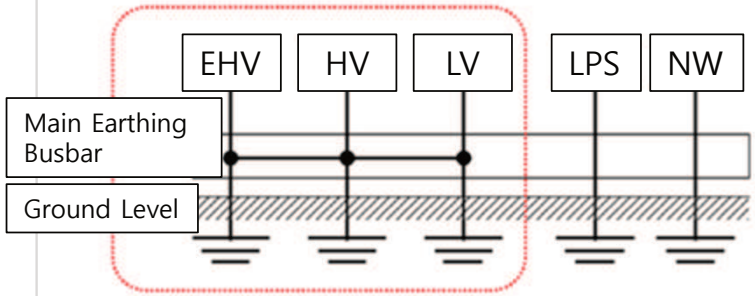
Note. Grounding Plan

- Integrated Earthing System for improving electrical safety of accelerator

Separate Earthing



Common Earthing System



Intergrated Earthing System