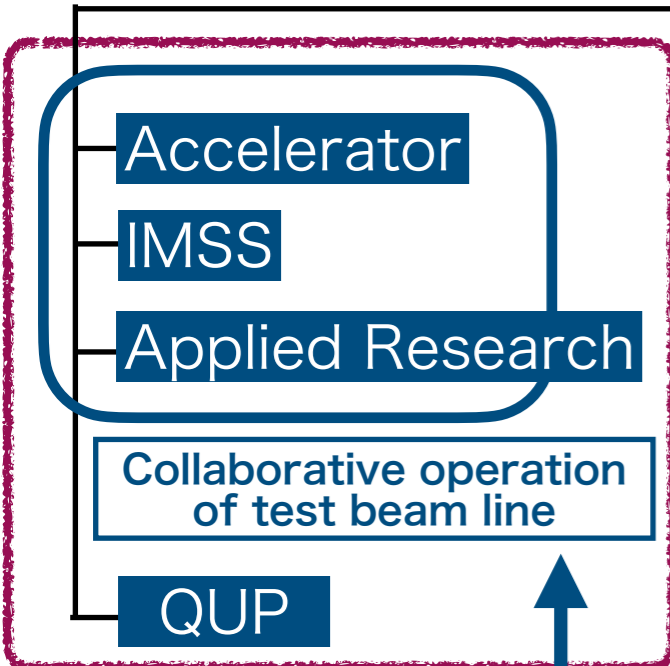


IPNS

Experiment Grp.



Theory Center

Wako Nuclear Physics Center

Support Grp.

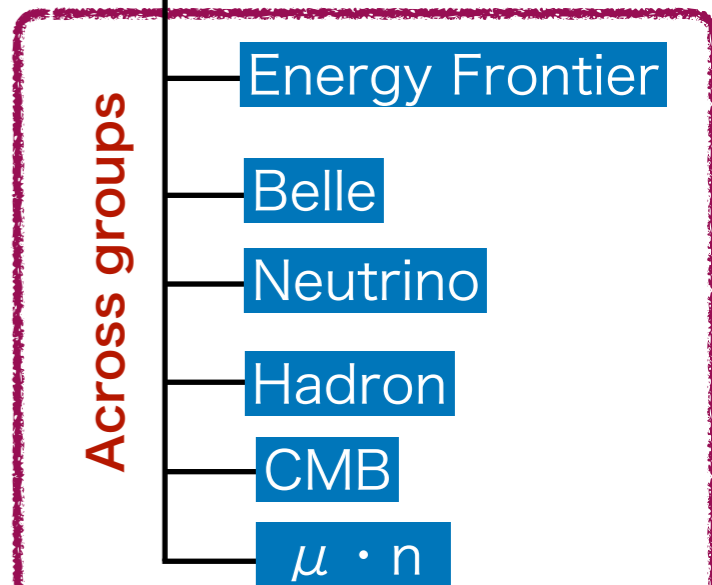
safety

computing

Electronics

Cryogenics

Mechanics



Collaboration within KEK

Instrumentation Technology Development Center (ITDC)

International Hub for instrumentation development with diversity

- Test beam line → More efficient, faster development
- Training for young researchers

Inter-University Research Devision



Cutting Edge Technology Development Devision

Collaborative development of next generation key technologies

- New idea by interdisciplinary communication
- Education by OJT

Researcher Community

Across organizations

- Universities
- Communities for
 - high energy physics
 - nuclear physics
 - cosmic ray

Industry and more wide range of research fields

Across fields

- Solid state physics
- Life science
- Material science
- Accelerator physics

from April 2023

KEK



IPNS

Experiment Grp.

Accelerator

IMSS

Applied Research

Collaborative operation of test beam line

QUP

Collaboration within KEK

Theory Center

Wako Nuclear Physics Center

Support Grp.

safety

computing

Instrumentation Technology Development Center (ITDC)

Across groups

Energy Frontier

Belle

Neutrino

Hadron

CMB

$\mu \cdot n$

Researcher Community

Across organizations

- Universities
- Communities for
 - high energy physics
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 - cosmic ray

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International Hub for instrumentation development with diversity

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Inter-University Research Devision

seamless cooperation

Electronics

Cryogenics

Mechanics

Cutting Edge Technology Development Devision

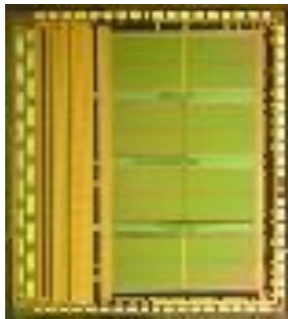
Collaborative development of next generation key technologies

- New idea by interdisciplinary communication
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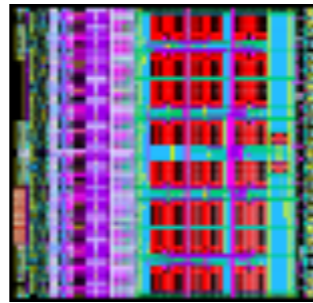
Electronics, Cryogenics, and Mechanics group

~Supporting various projects~

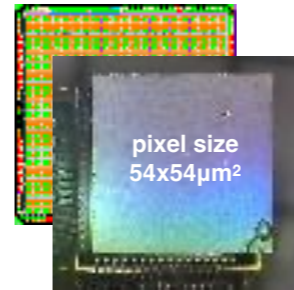
● Electronics group



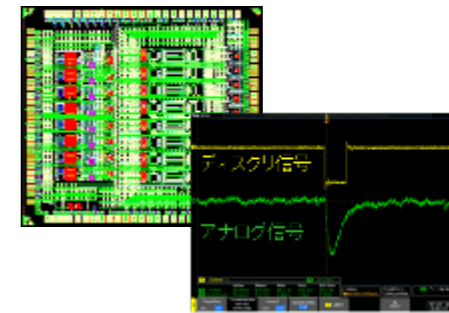
Belle II SVD
upgrade
ASIC @2020



J-PARC g-2/EDM
128ch ASIC @2020



COMET
muon monitor
@2021



Digitizer for Belle II
Drift Chamber

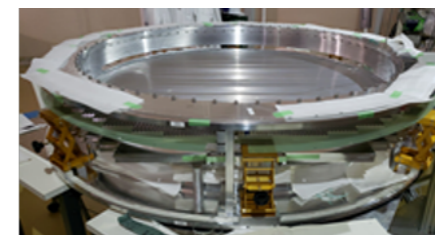
● Cryogenics group constructs and/or supports operation of

- ▶ Belle solenoid
- ▶ COMET and neutrino beam line magnets
- ▶ Dilution refrigerator



● Mechanics group contributions to

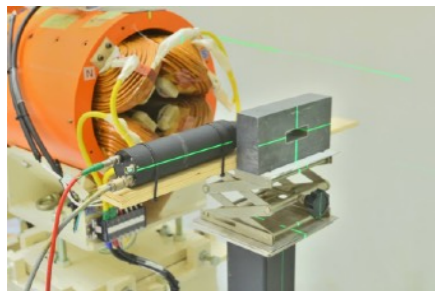
- ▶ Belle II vertex detector
- ▶ COMET shields and calorimeter
- ▶ g-2/EDM silicon detector design





Inter-University Research

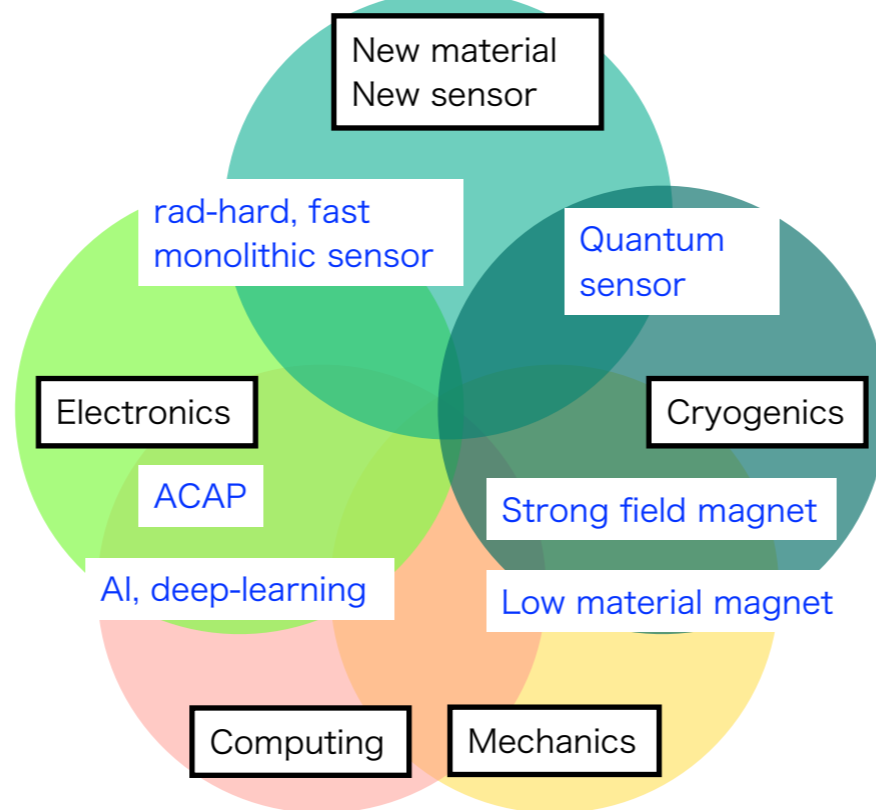
- Extension of inter-university research functions
- More efficient and faster development



- Wider users by simpler system for use
→ Young researchers such as student can easily use
→ Education

Cutting Edge Technology Development

- **Common/Core technologies for next generation projects**
← final application by each project (continue to have support function)
- **Bottom-up research : some R&D platforms**
 - ▶ works as the interface to the community
- **ITDC own development candidates**
 - ▶ Monolithic semiconductor pixel sensor
 - New material (eg. CIGS) for rad-hard
 - BiCMOS technology for high speed
 - ▶ Cryogenics and superconducting technology
 - Temperature below dilution refrigerator
 - High field magnet



Technology Development Platforms

Cryogenics

Mechanics

Sensor

Light sensor

semiconductor

gas & active medium

Electronics

System integration

Collider Electronics

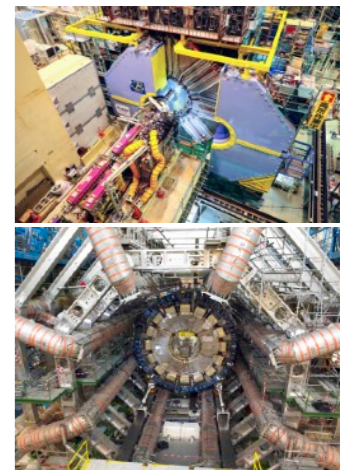
SPADI alliance

Computing

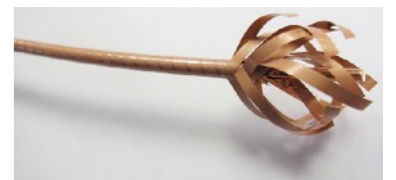
Platform Organization flexible, always ready to start new one

Researcher Community

IPNS projects



KEK projects



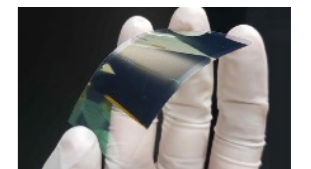
REBCO for HL-LHC

Education



HEP school

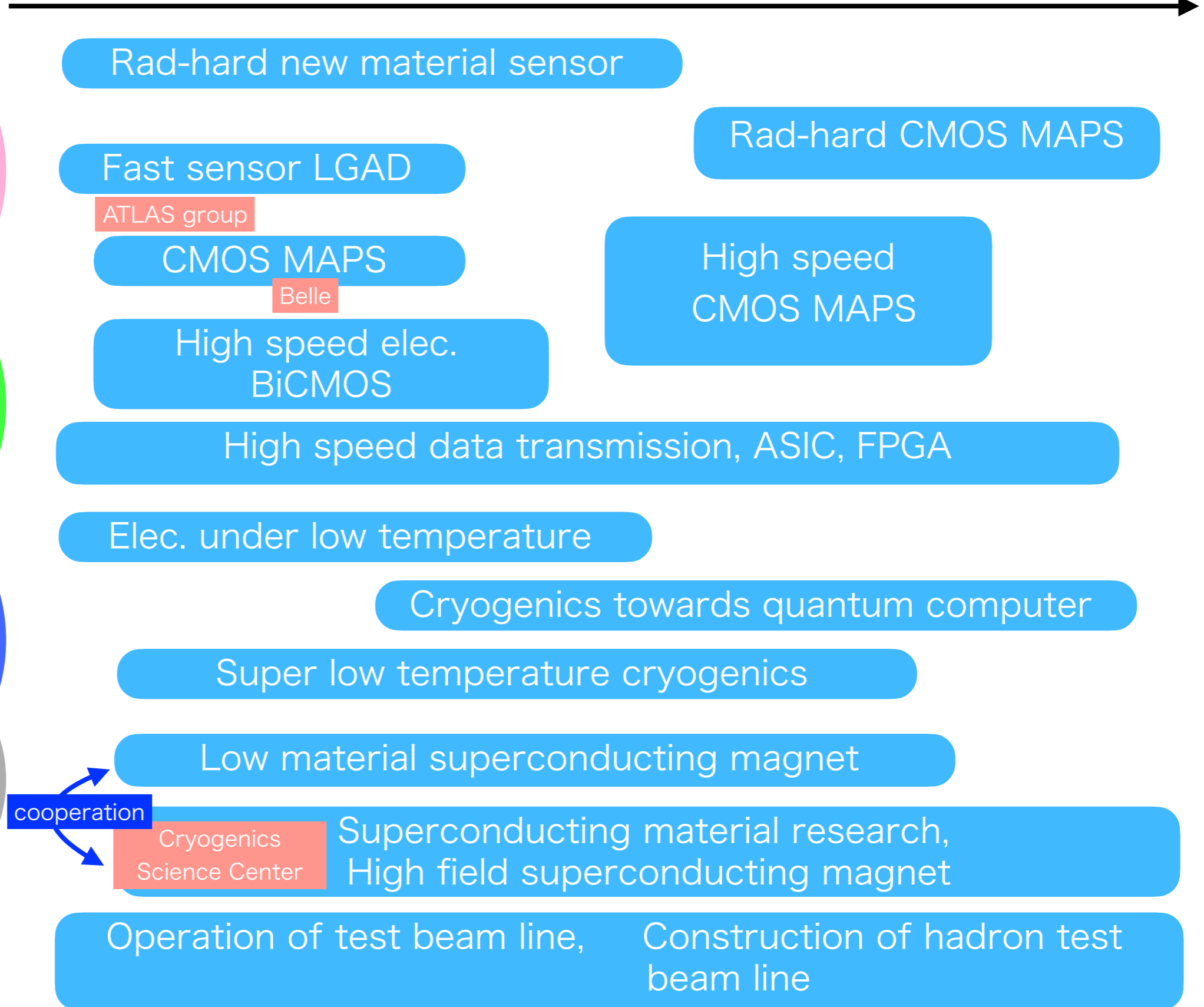
Industry



organic semiconductor

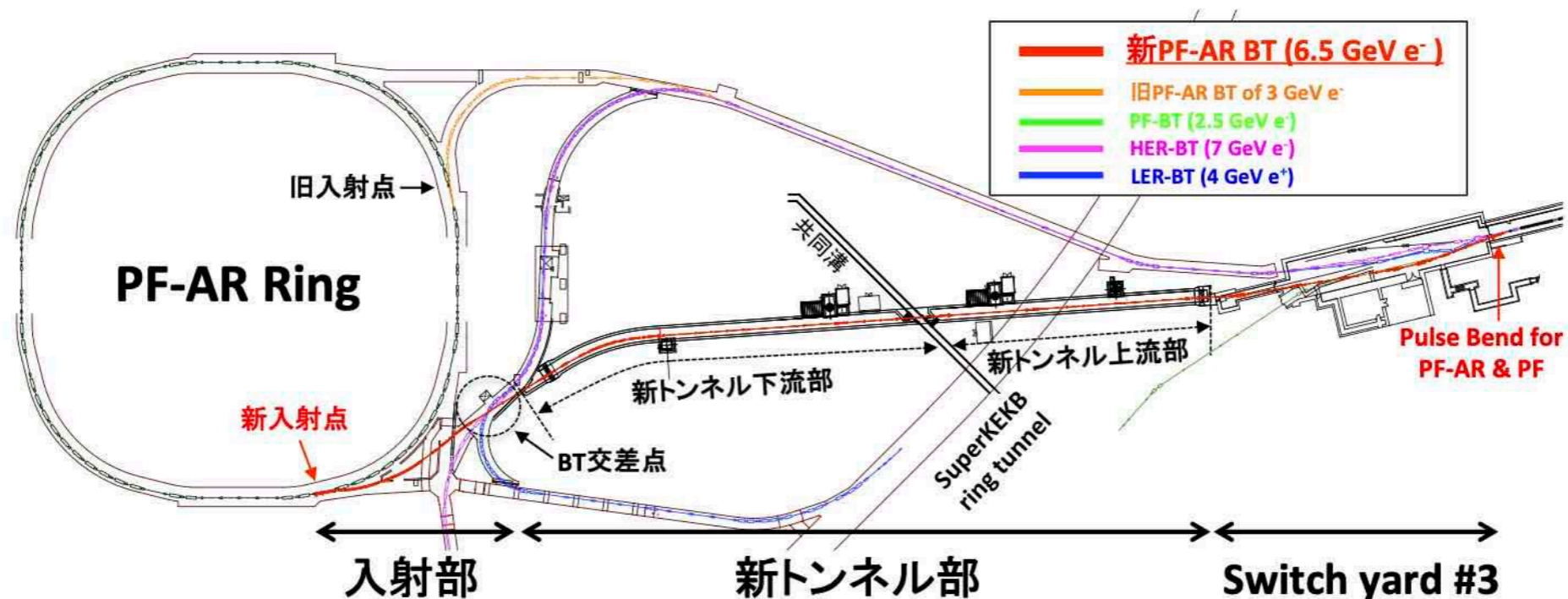
ITDC Roadmap

time

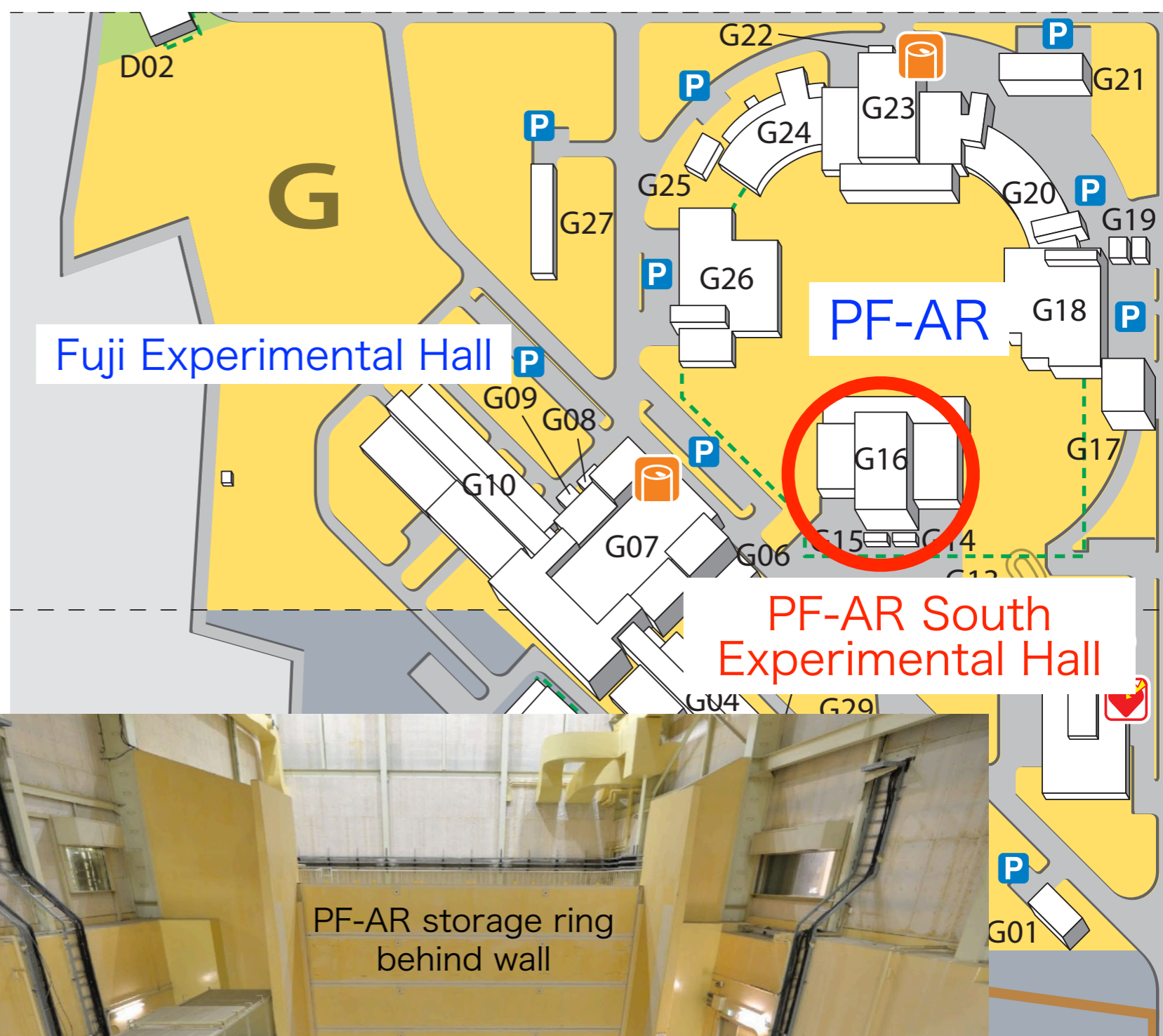


PF-AR

- One of the synchrotron photon source operated by Photon Factor Facility in IMSS
 - PF 2.5GeV
 - Photon Factory Advanced Ring (PF-AR)
 - 6.5GeV or 5GeV electron beam as a light source
- Single bunch beam with its revolution frequency of $1.257 \mu s$
- Beam current $\sim 50mA$
- Top-up injection is possible



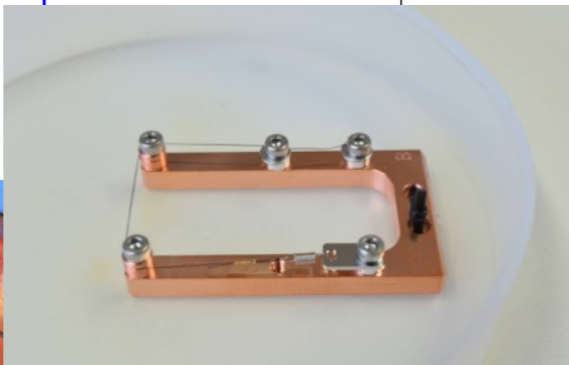
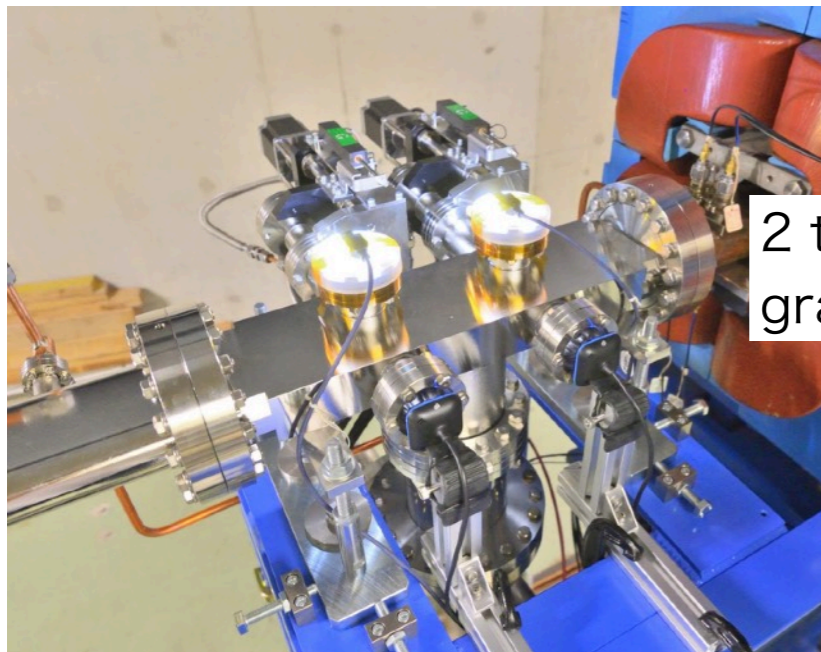
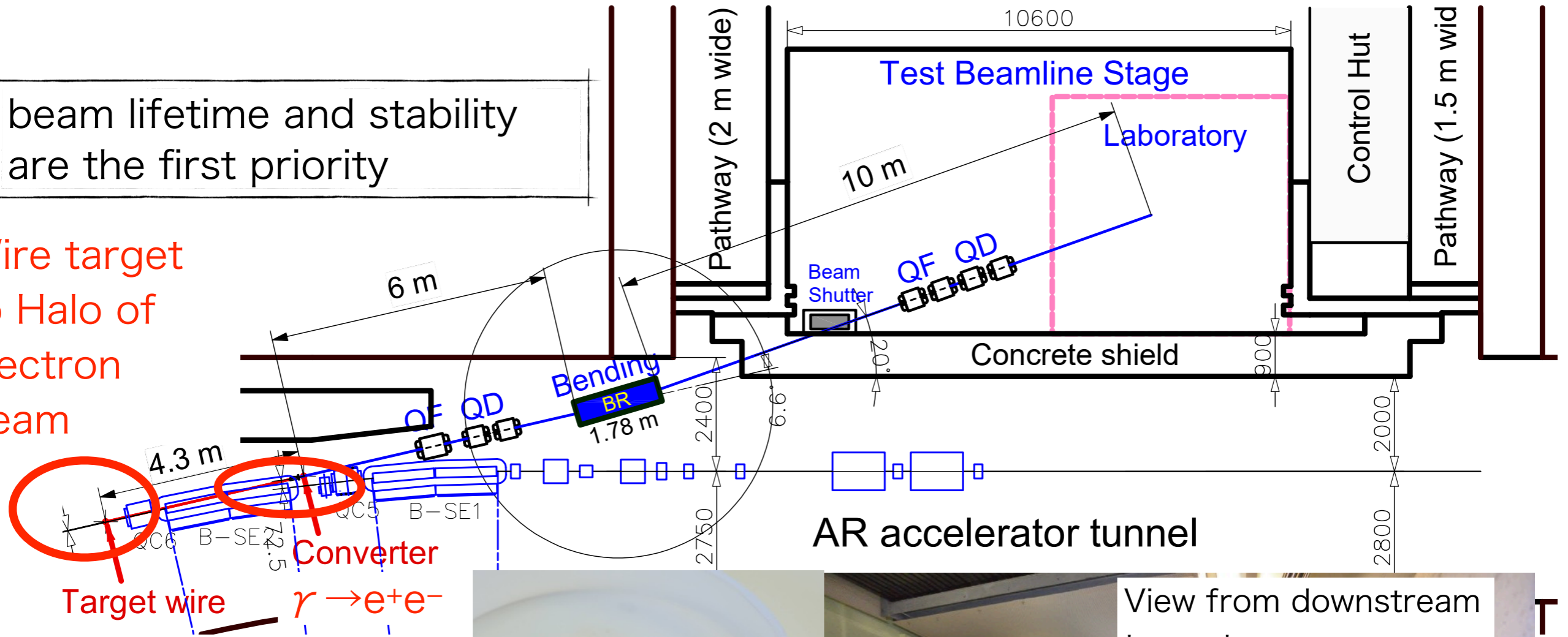
Test Beam Line at PF-AR



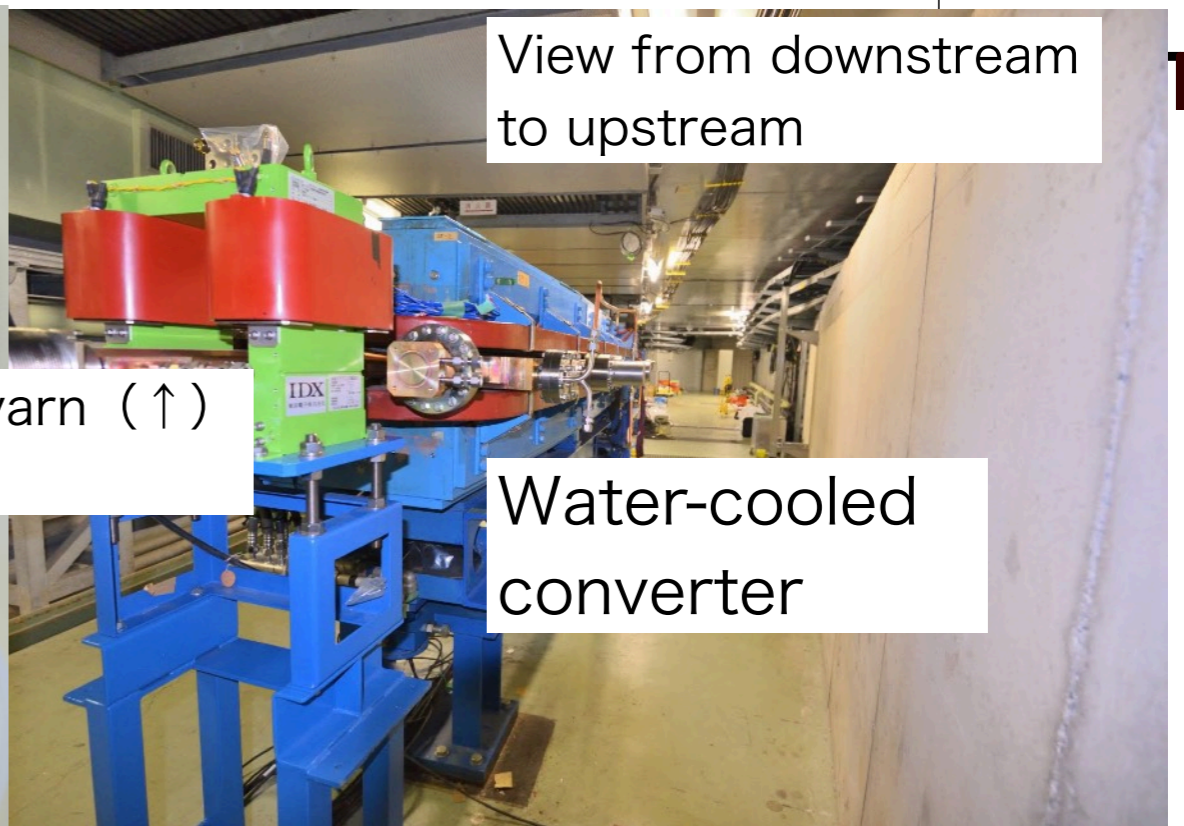
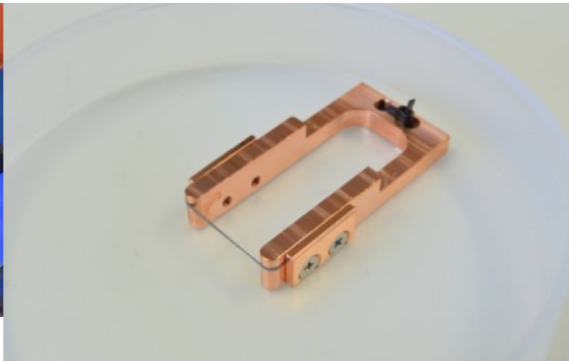
Overview of test beam line

beam lifetime and stability are the first priority

Wire target to Halo of electron beam



2 types of target : CNT yarn (↑)
graphite sheet (↓)



View from downstream to upstream

Water-cooled converter

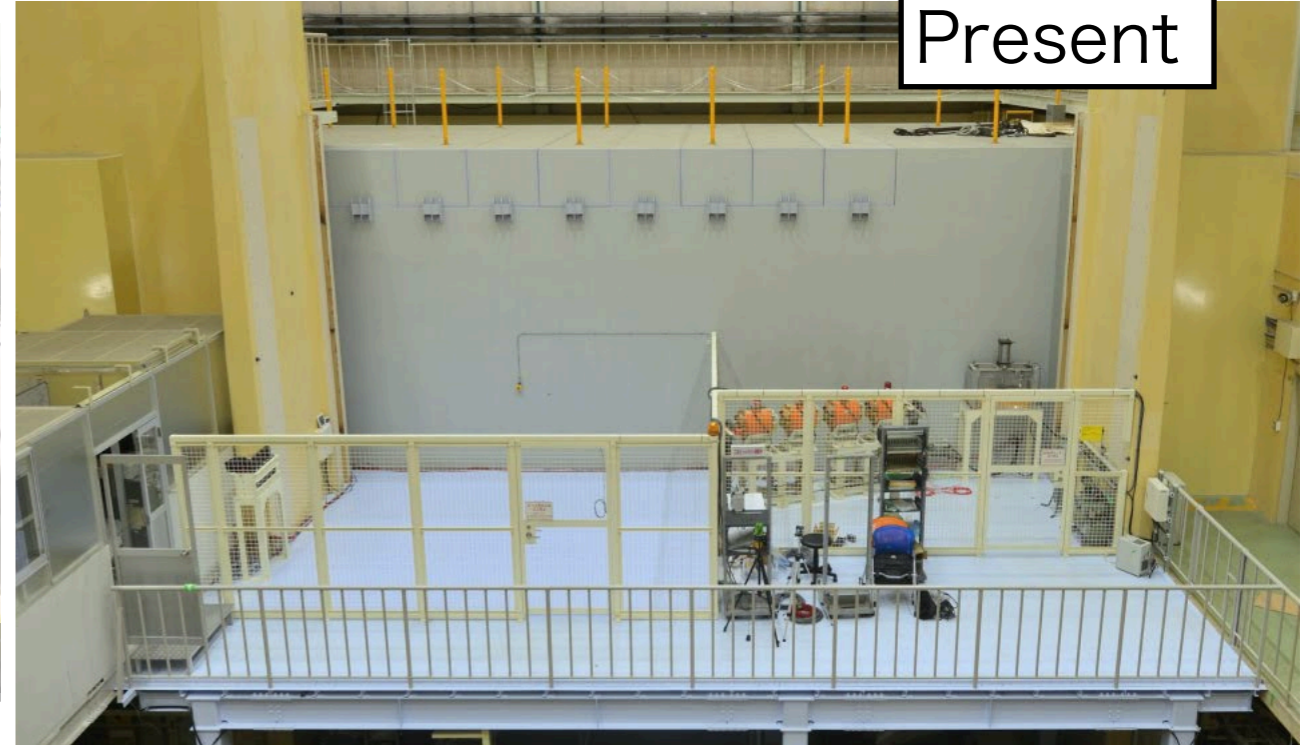
Construction scene

beam line scribing

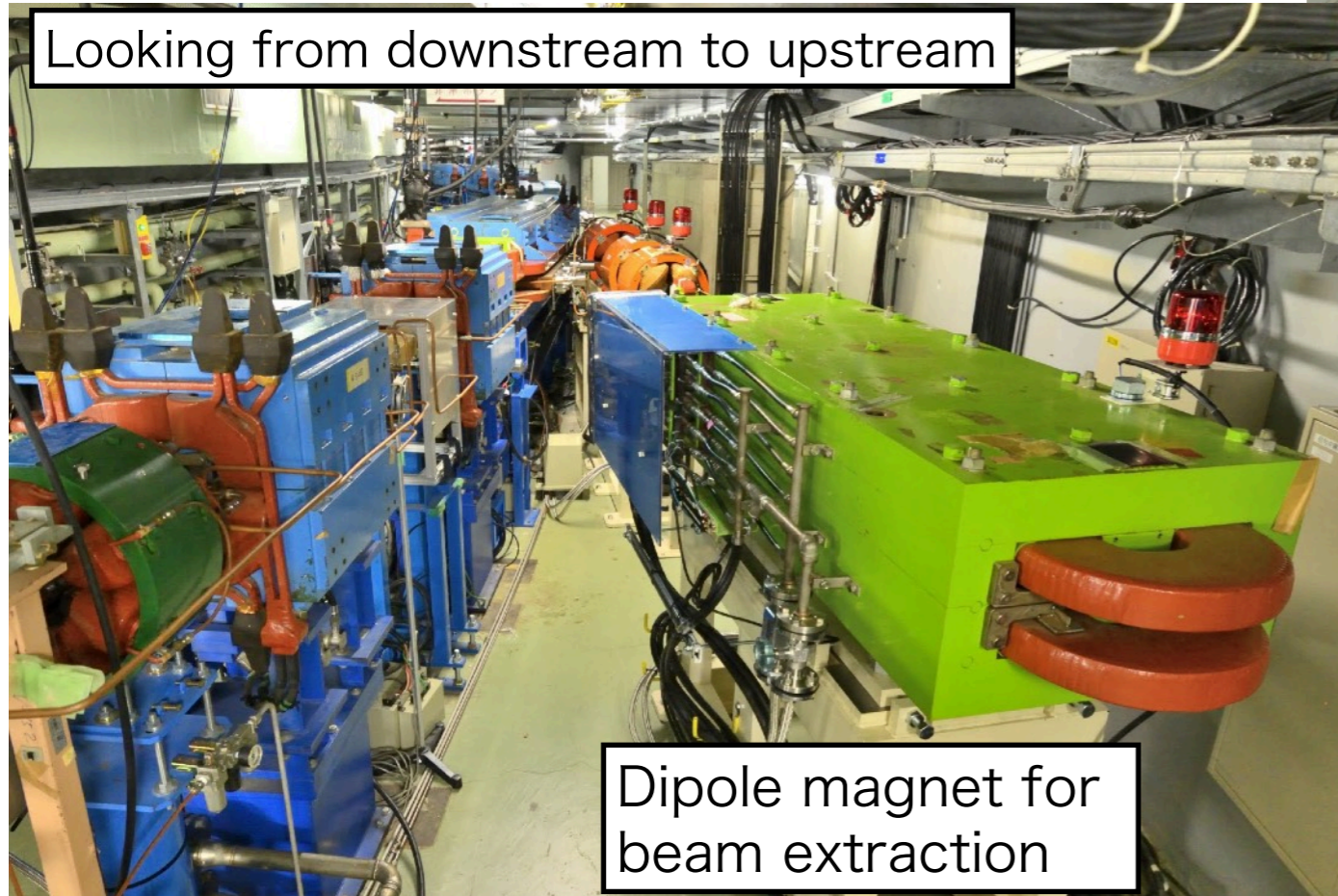


Transfer and installation of dipole magnet

Present



Looking from downstream to upstream



Dipole magnet for beam extraction

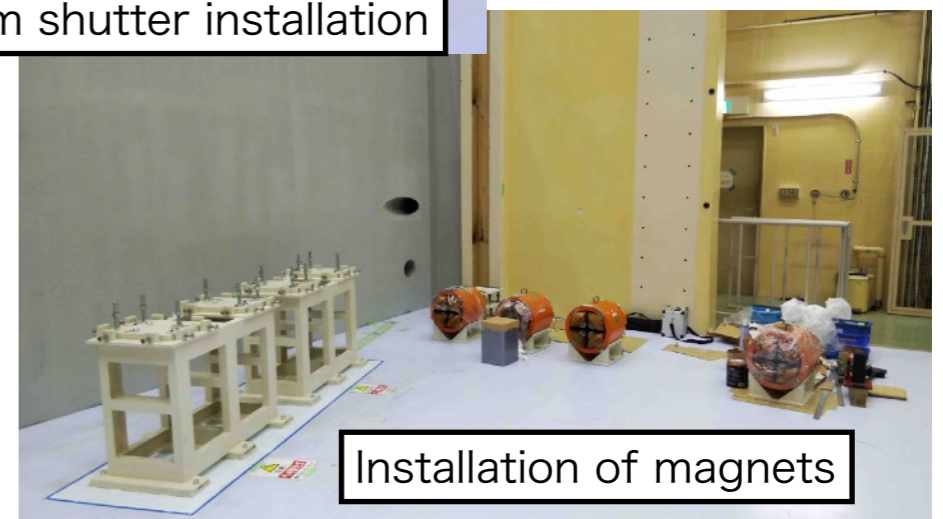
Removal of core



Beam shutter installation

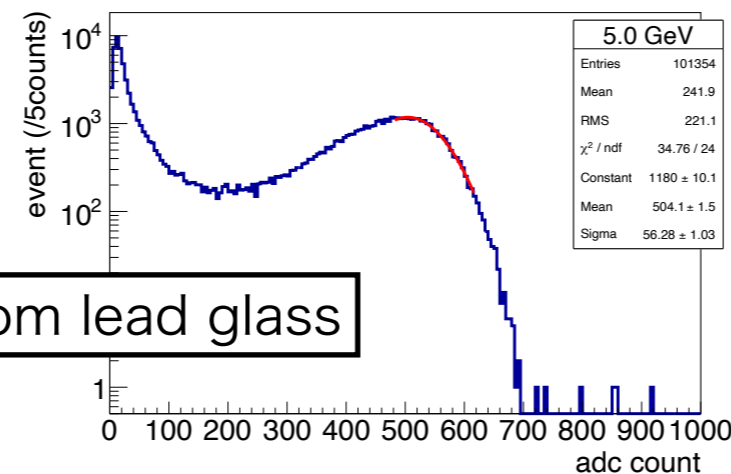
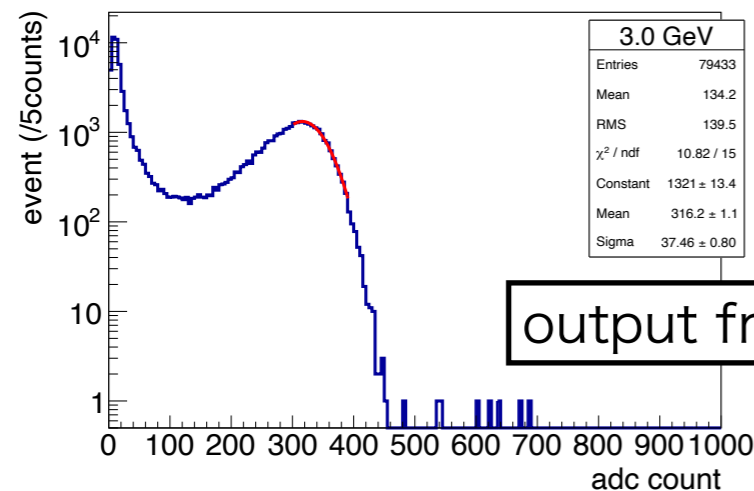
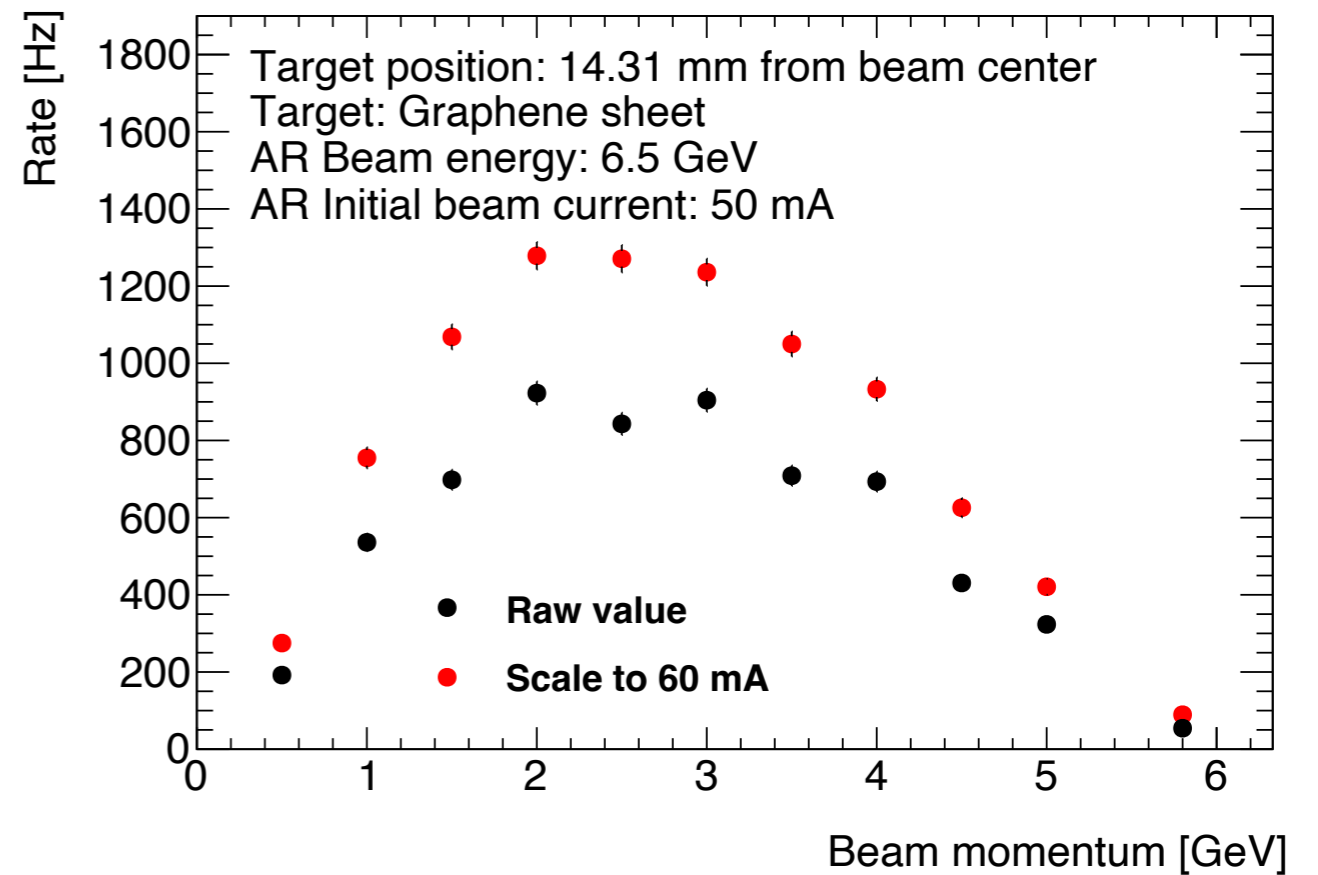
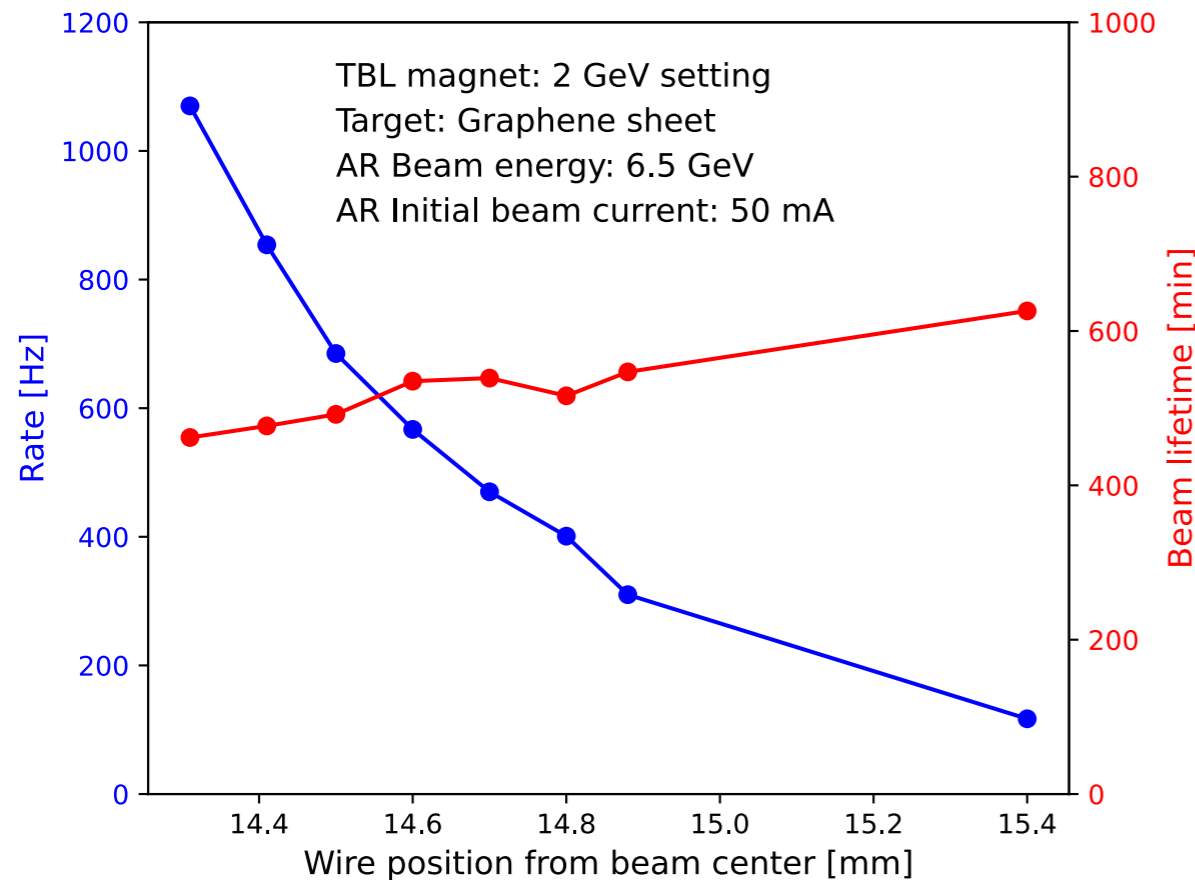


Installation of magnets

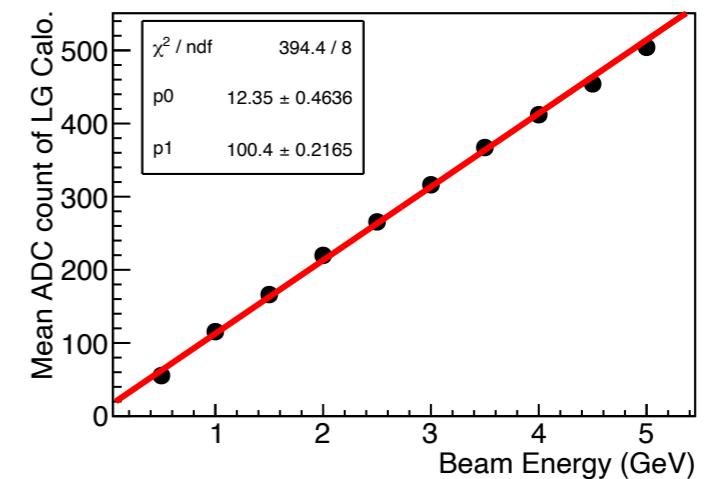


First Beam Extraction on March 2022

- Rate measurement by scintillators plus PMT's
 - Strongly depends on how deep we can insert target
 - ← subject of negotiation with Photon Factory



output from lead glass



Start of Test Use

- Despite of still we are in beam commissioning, test use started on November 2022



Summary of Test Beam Line at PF-AR

- Electron beam with its energy from roughly 1 to 5 GeV
 - ▶ Peak rate is O(kHz) at around 2 or 3 GeV
 - ▶ Higher rate will be possible after more experience of running
- The official use will start on June 2023
- PF-AR user time was ~2400 hours in FY2022
 - ▶ Usually three running periods, about one month each
 - ❖ February to March
 - ❖ May to June
 - ❖ November to December