

Japanese Perspective

W. Ootani

CALICE Collaboration Meeting, Sep. 28th, 2023

My Personal Perspective

W. Ootani

CALICE Collaboration Meeting, Sep. 28th, 2023

Detector R&D in Japan

- Many different HEP projects with significant Japanese involvement
 - Energy Frontier (ILC, HL-LHC), Neutrino Physics (T2K, SK, HK), Flavour Physics (SuperKEKB/Belle II, kaon, muon), Non-accelerator Experiments ($0\nu\beta\beta$, DM, CMB), etc.
 - Many different detector R&D activities accordingly including calorimetry, but
- No real coordination for detector R&D (\leftrightarrow ECFA DRDs, US RDCs)
 - R&D on individual project basis
 - Funding request on individual project basis
 - Grant-in-Aid for Scientific Research (Kakenhi): up to 200-300kCHF for 3-5 years for detector R&D
- Significant budget increase for accelerator R&D (ILC Technology Network, ITN), but it doesn't include detector R&D
- Participation in ECFA DRDs
 - DRD1 (gaseous detector), DRD3 (silicon), DRD5 (quantum technology), DRD6 (calorimeter)
 - On individual project/institute basis, no coordination

Recent Development

- KEK initiative for detector R&D
 - New detector R&D center (ITDC) has been established
 - R&D platforms
- JAHEP committee for future plans
 - Discussing future HEP projects in Japan (see “Japan’s Strategy for Future Projects in High Energy Physics” ([arXiv:2203.13979](https://arxiv.org/abs/2203.13979)): submitted to the Snowmass2021)
 - Including discussion on future technologies on quantum technology, AI, cutting-edge detector technologies
- Hoping these can evolve to more strategic and coordinated efforts for detector R&D

Detector R&D with KEK Initiative

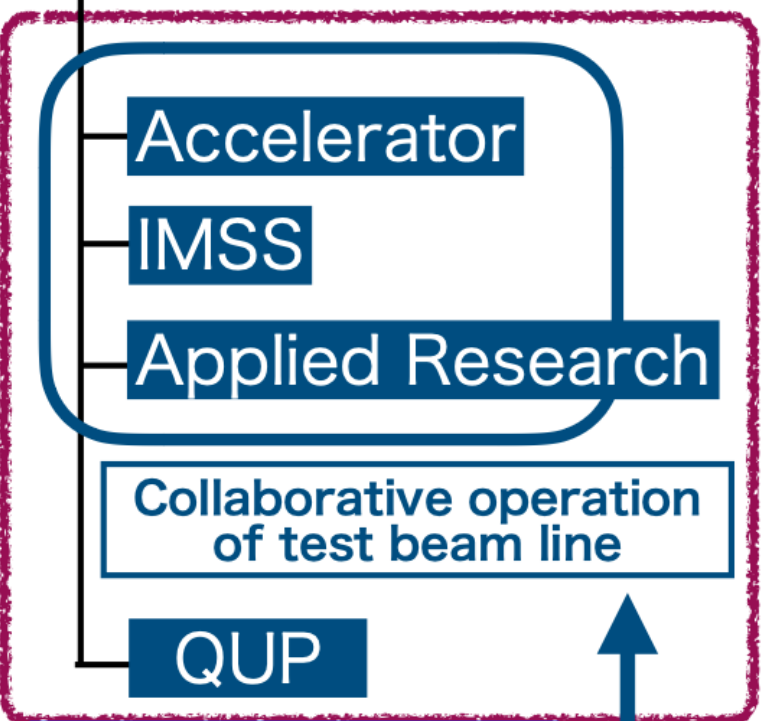
from April 2023

KEK



IPNS

Experiment Grp.



Theory Center

Wako Nuclear Physics Center

Support Grp.

safety

computing

Across groups

Energy Frontier

Belle

Neutrino

Hadron

CMB

$\mu \cdot n$

Collaboration within KEK

Instrumentation Technology Development Center (ITDC)

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

International Hub for instrumentation development with diversity

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

Inter-University Research Devison



Electronics

Cryogenics

Mechanics

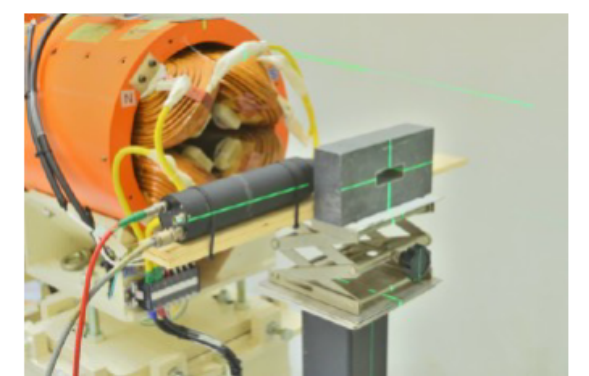
Cutting Edge Technology Development Devison

- Collaborative development of next generation key technologies
- New idea by interdisciplinary communication
 - Education by OJT

Courtesy of K. Hanagaki (KEK)

Inter-University Research

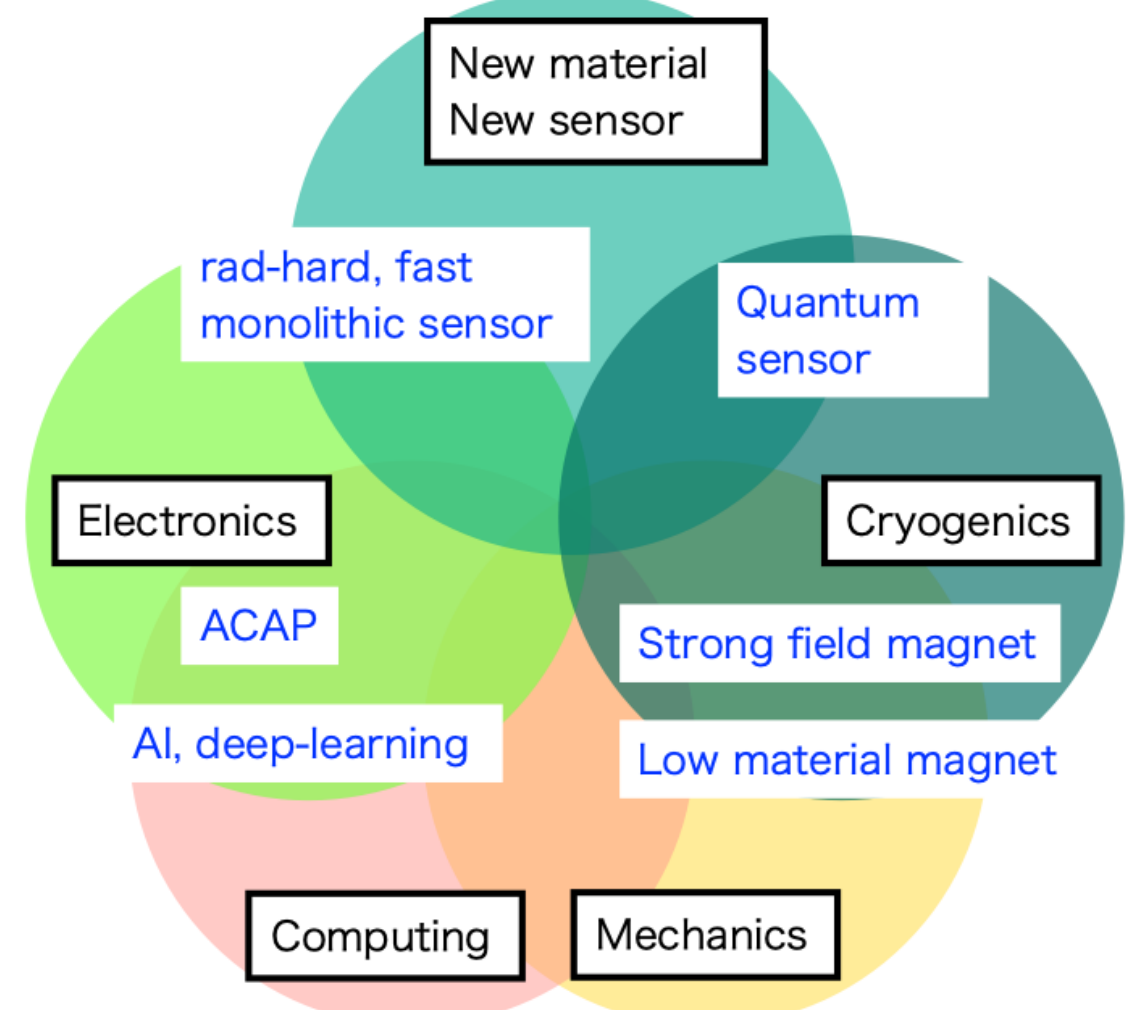
- New Test Beam Line**
- Extension of inter-university research functions
 - More efficient and faster development



- 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



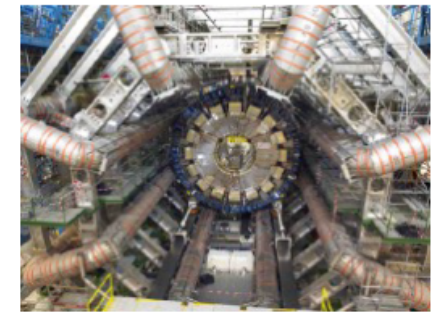
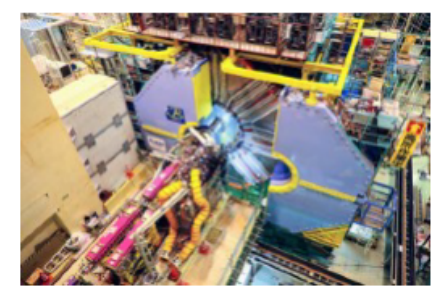
Technology Development Platforms

- Cryogenics**
- Mechanics**
- Sensor**
 - Light sensor
 - semiconductor
 - gas & active medium
- Electronics**
 - System integration
 - Collider Electronics
- Computing**

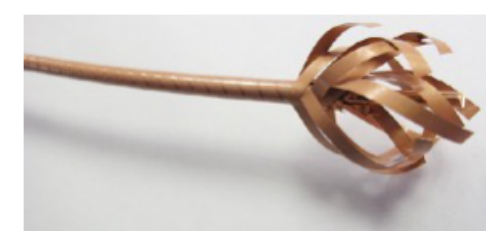
Platform Organization flexible, always ready to start new one

Researcher Community

IPNS projects



KEK projects



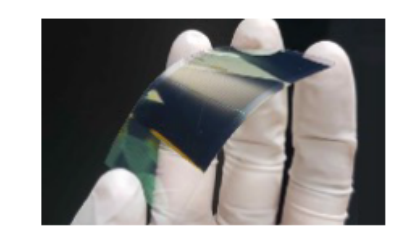
REBCO for HL-LHC

Education



HEP school

Industry



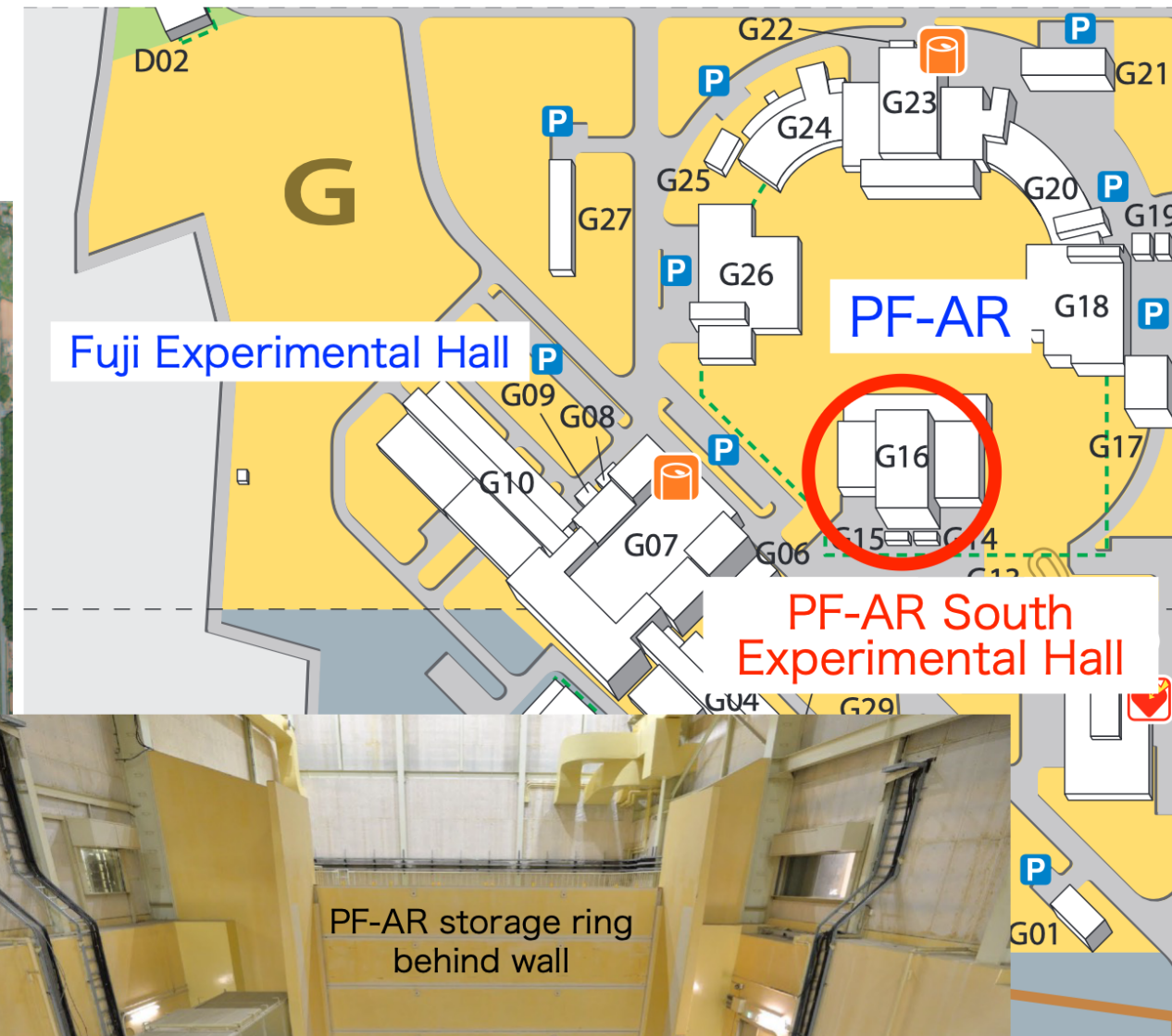
organic semiconductor

Courtesy of K. Hanagaki (KEK)

New Test Beam Line

- 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

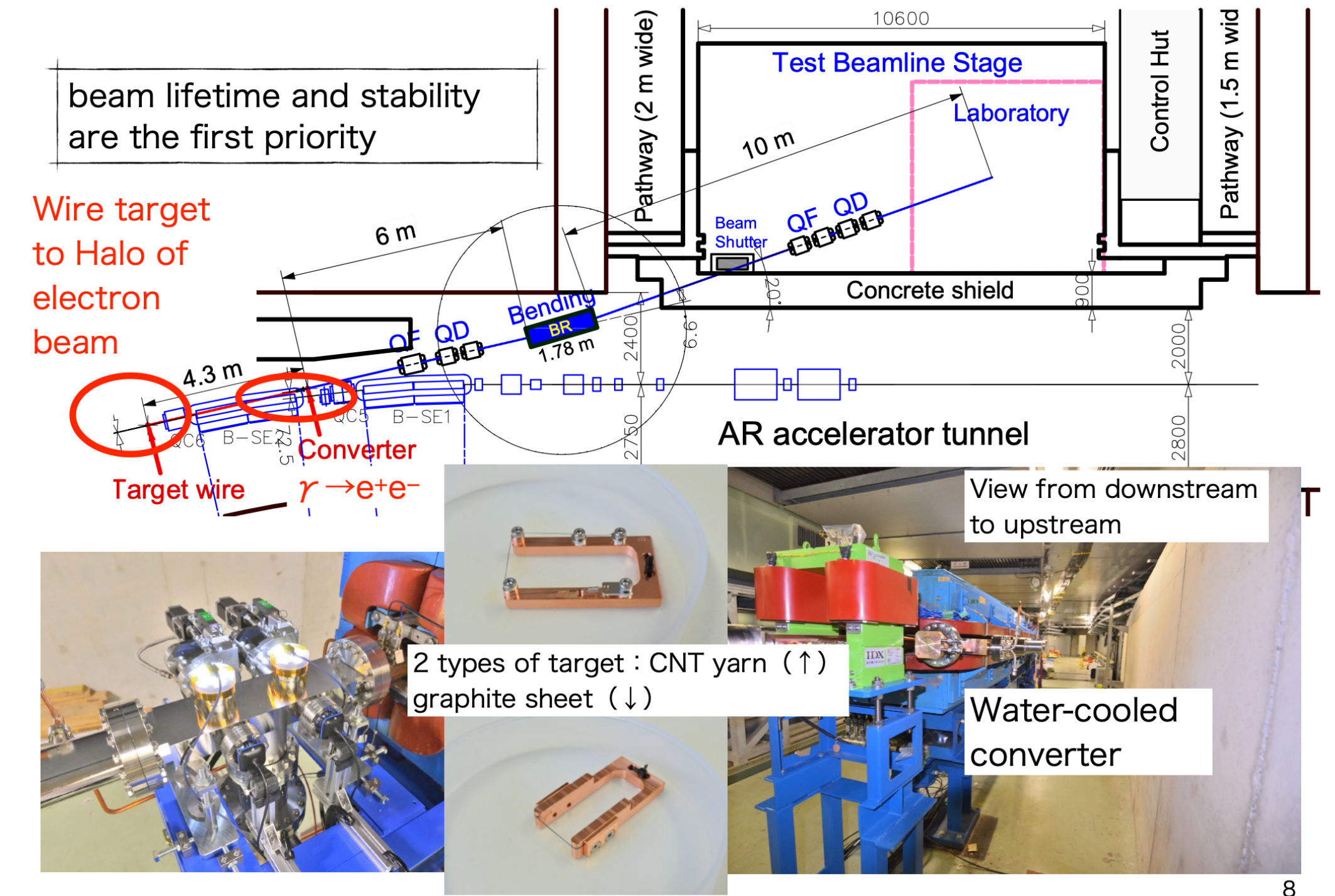
Test Beam Line at PF-AR



Before construction
Photo taken in April 2020

7

Overview of test beam line

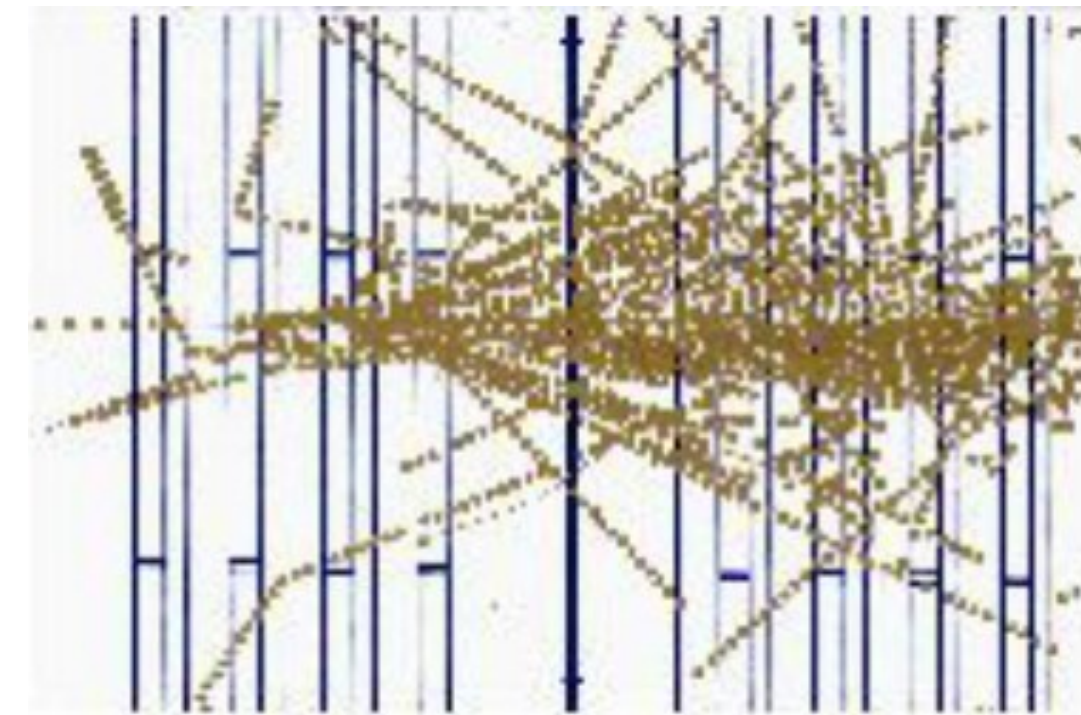


8

Courtesy of K. Hanagaki (KEK)

●CALOR 2024

- Date: May 20-25, 2024
- Venue: Tsukuba, Japan
- Jointly hosted by Univ. of Tsukuba and Univ. of Tokyo



CALOR2024

●LCWS 2024

- Date: July 8-11, 2024
- Venue: Univ. of Tokyo
- Jointly hosted by KEK and Univ. of Tokyo
- <https://agenda.linearcollider.org/event/10134/>

International Workshop on Future Linear Colliders, LCWS2024

8–11 Jul 2024
The University of Tokyo
Asia/Tokyo timezone

Overview

Timetable

Committees

The 2024 International Workshop on Future Linear Colliders (LCWS2024) continues the series devoted to the study of the physics, detectors, and accelerator issues relating to high-energy linear electron-positron colliders. A linear collider will initially operate as a Higgs factory, and provides a clear path for upgrades in energy and luminosity.

Since the last workshop (LCWS2023), many significant steps have been made. With a wide program of plenary and parallel sessions, this workshop will provide an opportunity to present ongoing work and to get informed and involved.

The workshop is scheduled from the morning of 8th of July to the late afternoon of 11th of July. We plan to have an evening reception on the 8th, and a conference dinner on the 10th. The workshop will be held at the University of Tokyo (Hongo and/or Yayoi campus), located in the heart of Tokyo.

Mark these on your calendar!