

KEK International Relations Updates

December 7, 2023

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High Energy Accelerator Research Organization (KEK)

Three large projects hosted at KEK

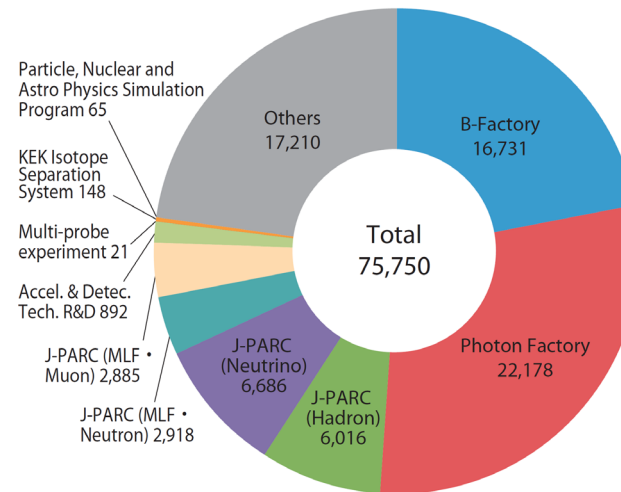
- **B Factory:** A large international collaboration with over 1100 members
- **Photon Factory:** Many active proposals with more than 3000 annual users
- **J-PARC:** Combination of large- and small-size user experiments

User Experimental Activities

B-Factory	1
Photon Factory	754
J-PARC (Hadron)	16
J-PARC (Neutrino)	3
J-PARC (MLF·Neutron)	126
J-PARC (MLF·Muon)	80
Multi-probe experiment	1
KEK Isotope Separation System	4
Particle, Nuclear and Astro Physics Simulation Program	17
Total	1002

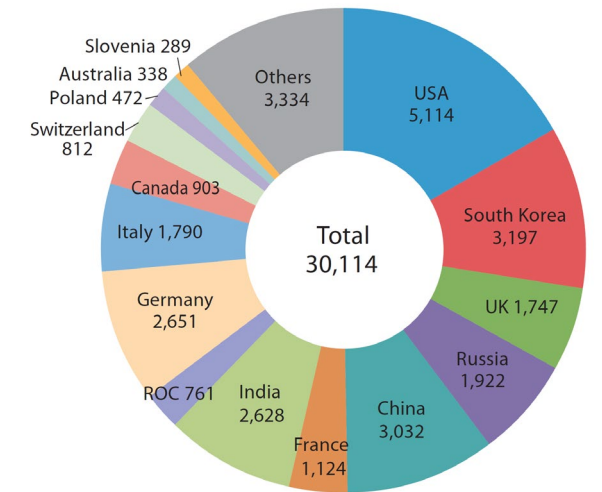
Number of Users

(person-days)



Number of Foreign Users by Countries & Regions

(person-days)



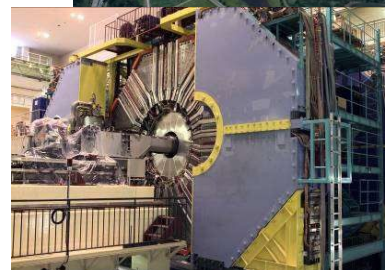
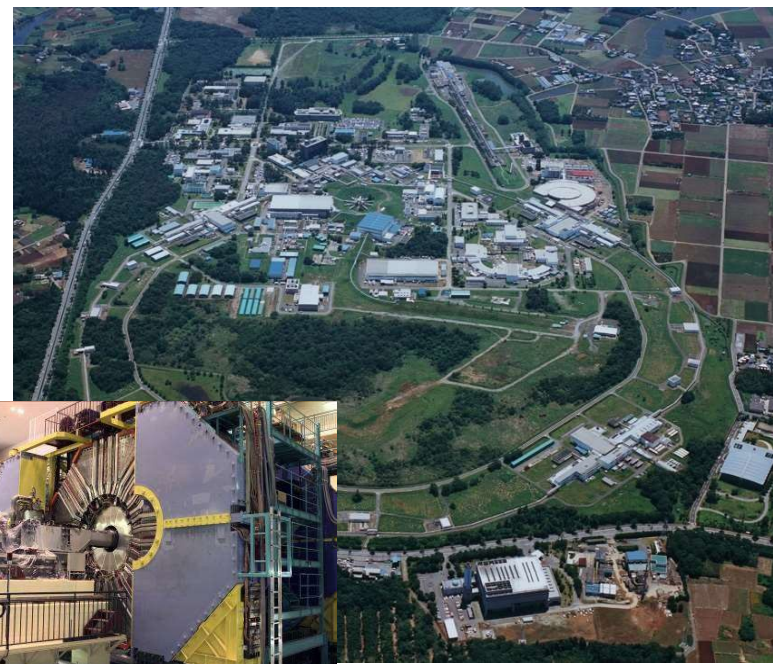
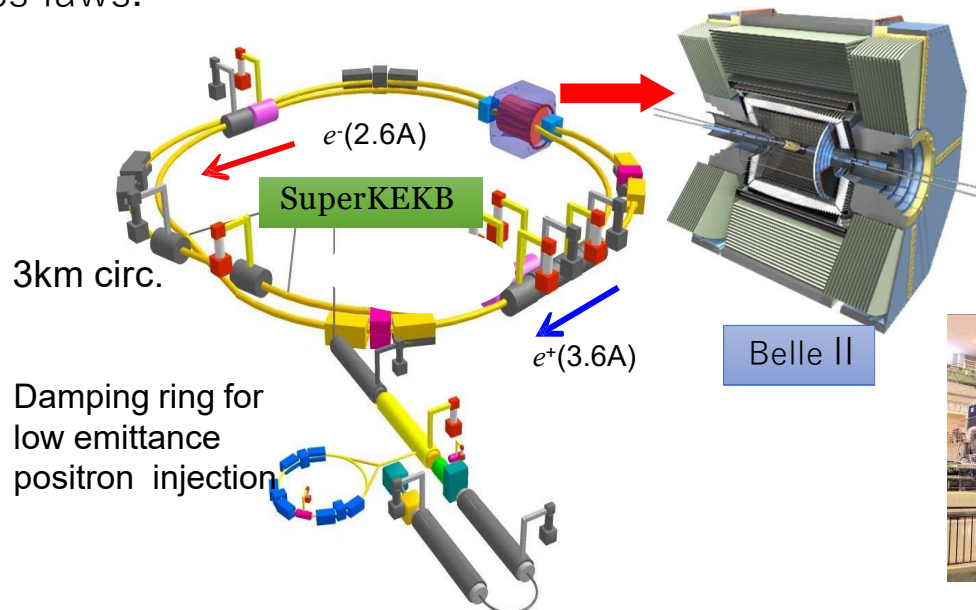
Statistics in FY2019 (before the influence of Covid19)

SuperKEKB and Belle II

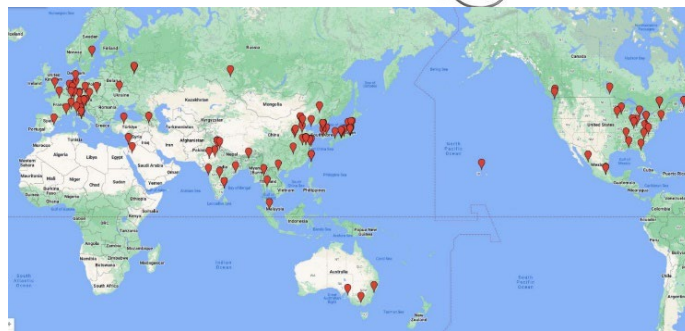
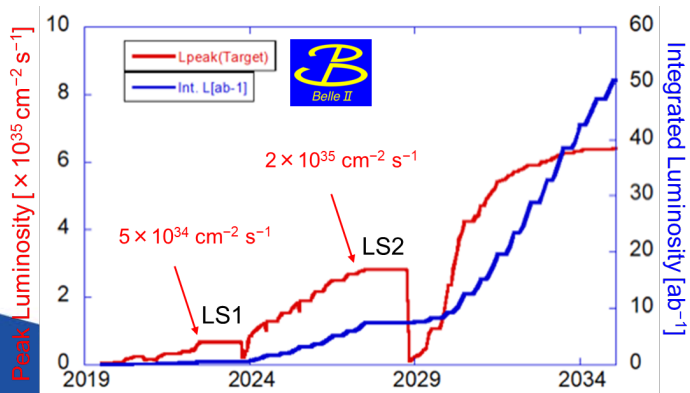
- KEKB/Belle discovered CP violation in B decays, leading to 2008 Nobel Prize in Physics to Drs. Kobayashi and Maskawa.
- SuperKEKB/Belle II is the 2nd phase of the B factory experiment aiming at discovery of new physics laws.

Belle II (2018-)

28 countries and regions,
122 institutes, 1170
members (Nov. 2023)



Plan of luminosity increase



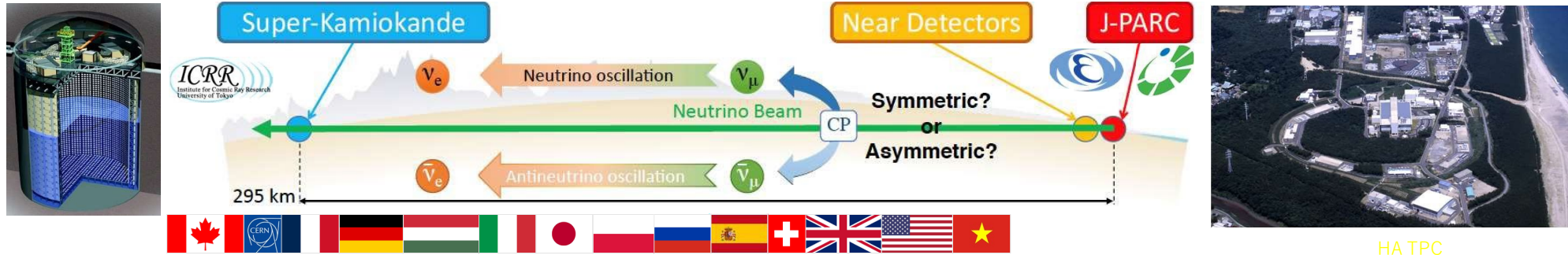
Insight through Accelerators.



Long Baseline Neutrino Experiment

Search for leptonic CP violation, a clue to mysteries of origin of matter

T2K experiment (2009~)



HA TPC

~470 members, 74 Institutes, 13 countries

HyperKamiokande

The next generation experiment under construction
 Plan to start operation in 2027.
 The University of Tokyo and KEK are host institutions



~500 members
 from 20 countries



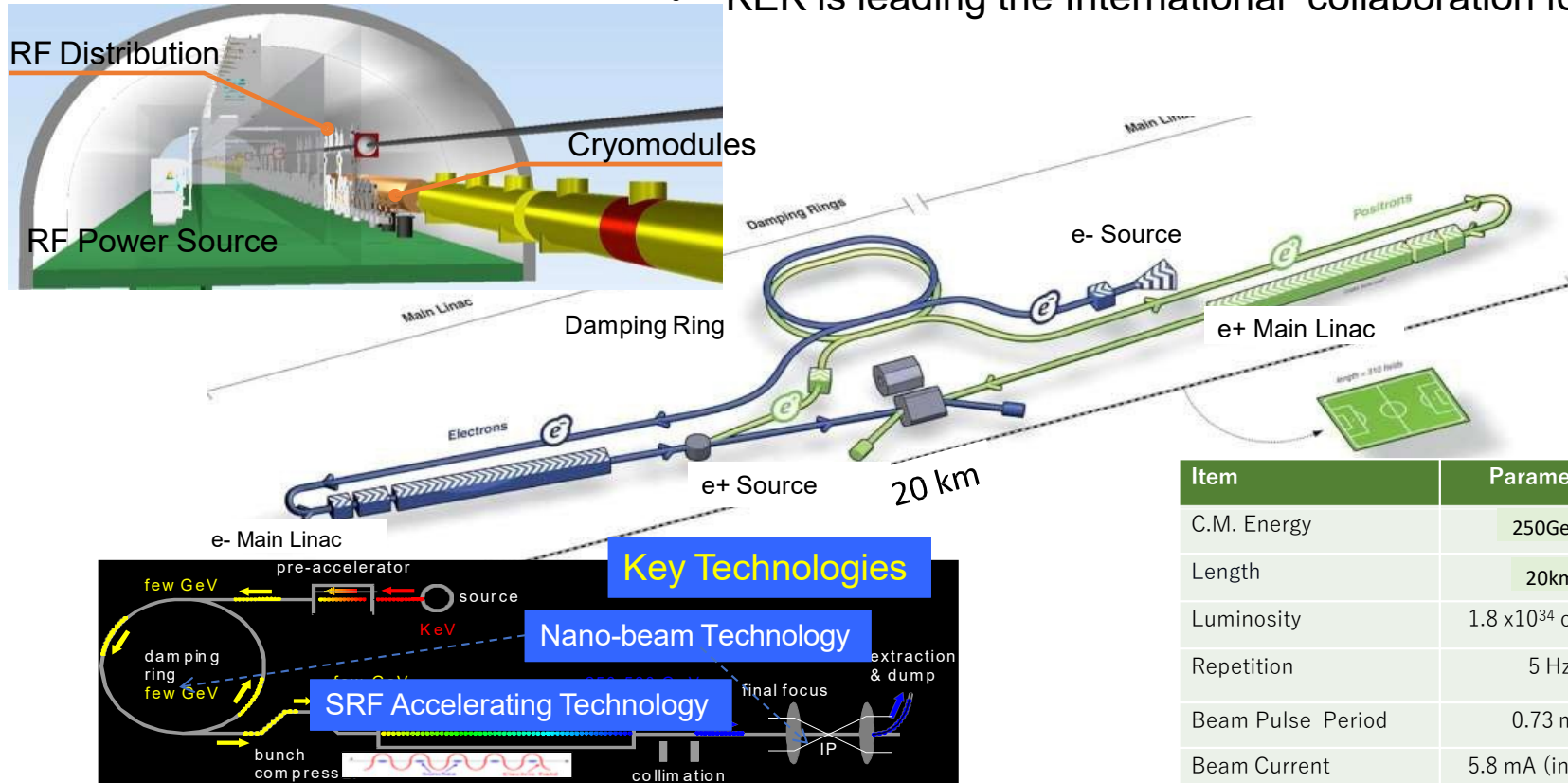
High power proton beam
 J-PARC and near detectors



- ~ 10 times larger detector
 - Fiducial mass: SK22.5kton → HK 190kton
- Beam power
 - 0.5MW → 1.3MW
- Aim to discover CPV and proton decay etc.

International Linear Collider

- ILC has been proposed by the international HEP community and supported by European strategy, US P5, etc. Its design has been conducted in a global framework by the initiative of the International Committee for Future Accelerators (ICFA).
- KEK is leading the International collaboration for ILC technology developments.



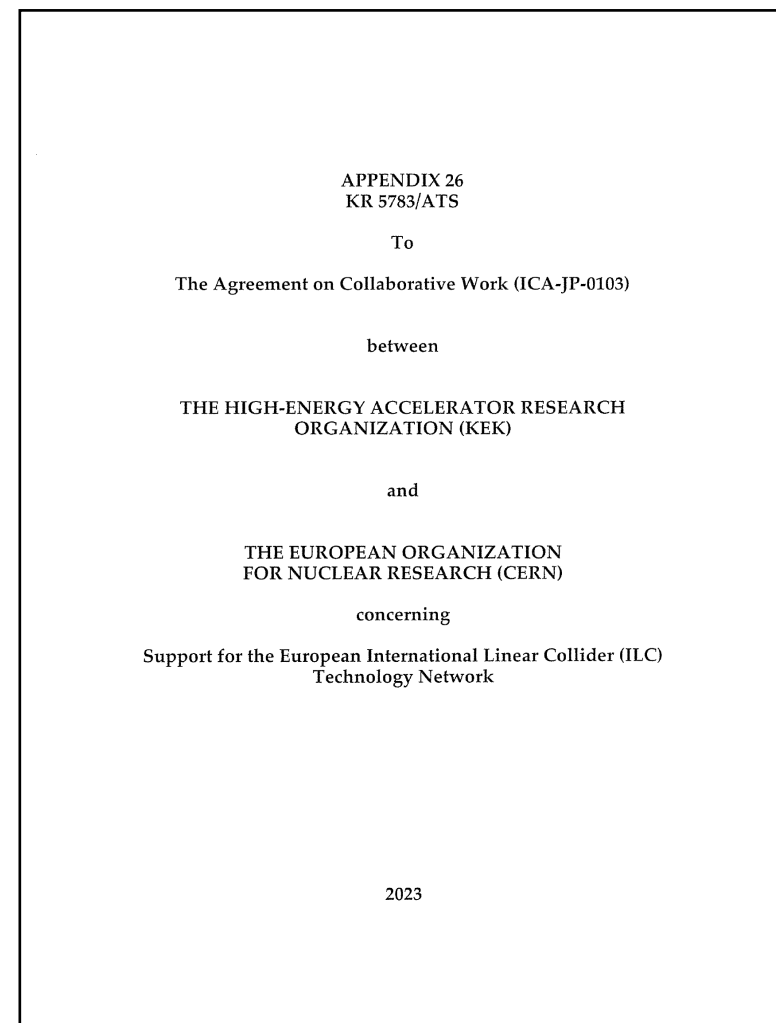
Item	Parameters
C.M. Energy	250GeV
Length	20km
Luminosity	$1.8 \times 10^{34} \text{ cm}^{-2}\text{s}^{-1}$
Repetition	5 Hz
Beam Pulse Period	0.73 ms
Beam Current	5.8 mA (in pulse)
Beam size (y) at FF	5.9 nm
SRF Cavity G. Q_0	31.5 MV/m $Q_0 = 1 \times 10^{10}$

- ### Recent developments
- ICFA setup ILC international Development Team (IDT) hosted by KEK in 2020 to proceed to the preparation phase of ILC.
 - KEK and IDT proposed the ILC Technology Network (ITN), a new framework for accelerator technology developments of high-priority work packages.
 - INT is being launched. CERN agreed to be the hub for European ITN activities.

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Long and strong cooperation between KEK and CERN

- The Agreement of Collaborative Work (ICA-JP-0103) between KEK and CERN (2009) and many appendixes to the Agreement
 - CERN-KEK branch offices (2014)
 - Cooperation in IDT (2020)
 - Cooperation in ITN (2023)
- MOU for collaboration in the HL-LHC project
 - Addendum to MOU for D1 magnet construction (2018)
- J-PARC and CERN Collaboration Agreement (2011)
- MOU for FCC Feasibility Study (2022)



US-Japan Cooperation Program in High Energy Physics

The US-Japan Cooperation Program in HEP was established in 1979 by the governments.

Currently Support about 30+ projects are supported on physics, accelerator and detector R&D, computing, etc. based on a joint call for projects.



Singing of a new Project Arrangement between DOE and KEK, October 2015

A long history of US-Japan cooperation in HEP since 1979

- Discovery of Top quark at TEVATRON
- Discovery of CP violation at B factory
- Rare Kaon decay experiments
- Cooperation in neutrino physics
- Accelerator R&D, etc. , etc.

Support for joint researches, exchange programs, schools, etc.

Toshiko Yuasa Laboratory (TYL)

France-Japan cooperation since 2006

Travel support to about 30 research teams

Student exchange

Joint workshops

Asian Forum for Accelerators and Detectors (AFAD)

Annual workshop in accelerator science, originally established in 2009. Rotating around 7 counties/regions

KEK-TRIUNF

Exchange Program for Early Career Researches

Ozaki Exchange Program

US-Japan, Student exchange



Support for international schools, internships

- Asia-Europe-Pacific School of High Energy Physics (AEPSHEP)
 - KEK Tsukuba/J-PARC Summer Student Program
 - Particle Physics School in South-East Asia
 - CERN Summer Institute
 - Athena program (Invitation Fellowship Program for Young Female Researchers in Asia-Pacific Counties)
- and so on.