

TIPP2026

Technology & Instrumentation
in Particle Physics Conference

Tata Institute of Fundamental Research, Mumbai
February 2-6, 2026

Topics

- Accelerator-based particle physics
- Non-accelerator particle physics, particle astrophysics and cosmology
- Experiments with synchrotron radiation and neutrons
- Nuclear physics
- Cosmology
- Instrumentation and monitoring of particle and photon beams
- Applications in photon science, biology, medicine, and engineering

The program focuses on all areas of detector development and instrumentation in particle physics, astro-particle physics and other closely related fields.

International Advisory Committee

- Niels van Bakel
- Elisabetta Barberio
- Ties Behnke
- Thomas Bergauer
- Sara Bolognesi
- Daniela Bortoletto
- Shikma Bressler
- Florencia Canelli
- Subhasis Chattopadhyay
- Marcel Demarteau
- Maria Teresa Dova
- Massimiliano Fiorini
- Francesco Forti
- Bruce Mellado Garcia
- Ingrid Gregor
- Boris Grynyov
- Karl Jakobs
- Manfred Krammer
- Susanne Kuehn
- Jianbei Liu
- Ana Amelia Machado
- Nayana Majumdar
- Gobinda Majumder
- Indranil Mazumdar
- Petra Merkel
- Satoshi Mihara
- Joachim Mnich
- Gautier Hamel de Monchenault
- Roman Poeschl
- Fabrice Retiere
- Paris Sphicas
- Iouri Tikhonov
- Maksym Titov
- Silvia Dalla Torre
- Grigori Trubnikov
- Juan Fuster Verdu
- Yifang Wang
- Marc Winter

Local Organizing Committee

- Rajdeep Chatterjee
- Moonmoon Devi
- Saranya Ghosh
- Shilpi Jain
- Gobinda Majumder (Chair)
- Puneet Patel
- Rudrajyoti Palit
- Mandakini Patil
- Prakash C Rout
- Deepak Samuel
- Mandar N Saraf
- Prashant Shingade
- Ravindra R Shinde
- Piyush Verma

Welcome to TIPP2026

TIPP starts at KEK 17 years ago



Insight through Accelerators.



Basic Technology & Instrumentation are very important for our community.



1. KEK makes big effort for basic R&D

Instrumentation Technology Development Center

ITDC, newly established in 2022 under KEK-IPNS is engaged in

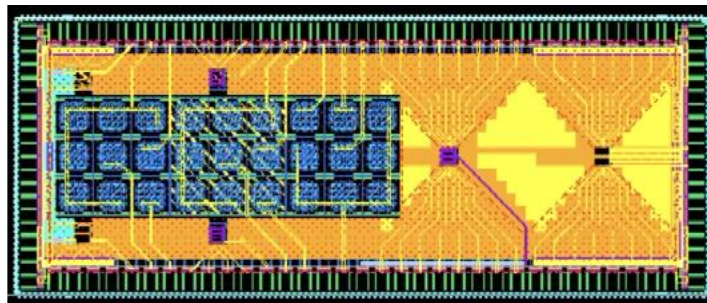
- Supporting major IPNS experimental projects,
- Strengthening Inter-university research collaboration
 - e.g. test beam line
- **Advancing next-generation technologies.**
 - ✓ Optical sensors(A), semiconductors(B), gas & active media(C), electronics (Collider Electronics Forum)
 - ✓ Development of **manufacturing processes** for aluminum-stabilized superconducting cables in collaboration with CERN
 - ✓ R&D on the solid-state detectors for future collider experiments, etc.

Collaboration detector R&D also welcome

Evaluation of CMOS sensor at test beam line



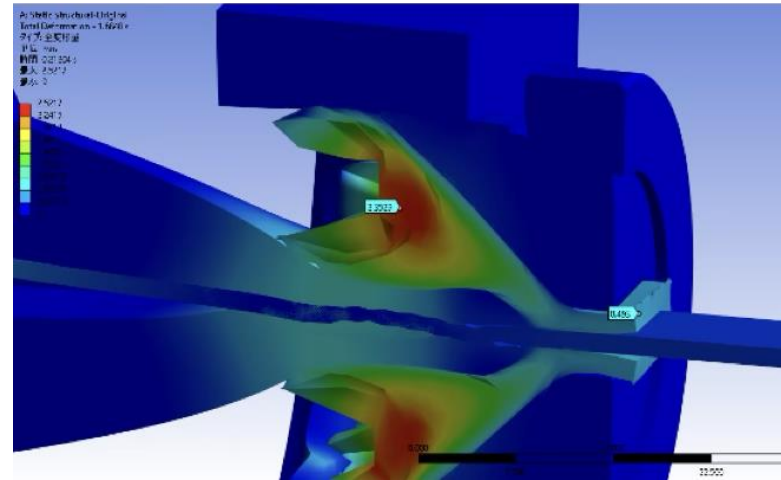
Development of the pixel sensor with additional gain layer



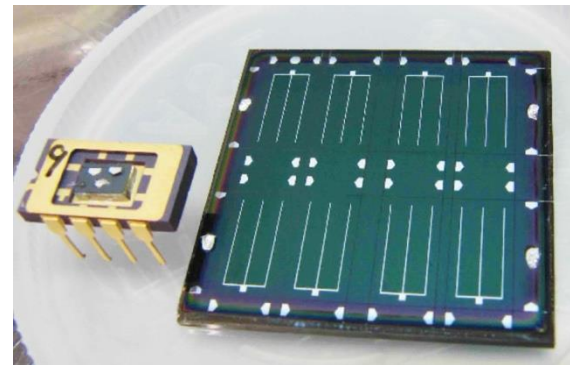
Insight through Accelerators.

Aiming to develop silicon detectors with high time resolution and low power consumption

Thermal calculations for manufacturing process for aluminum stabilizers.



Development of the new material solid-state sensors at platform B

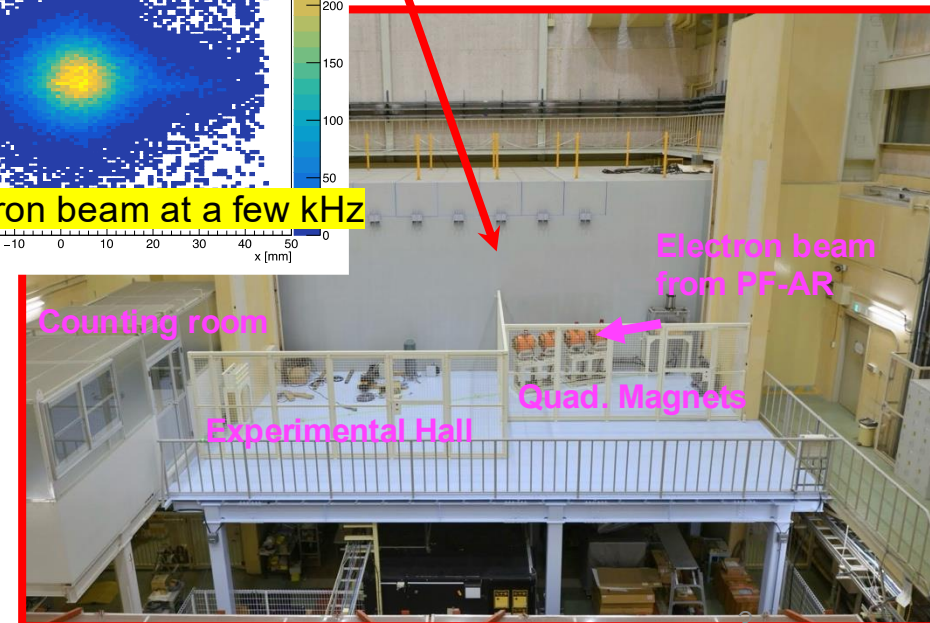
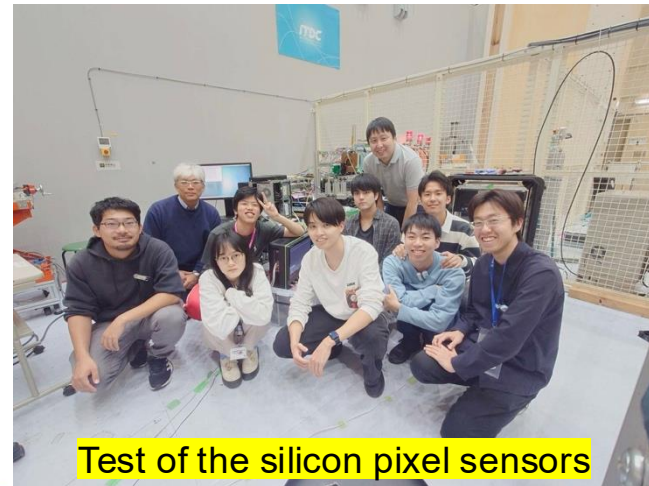
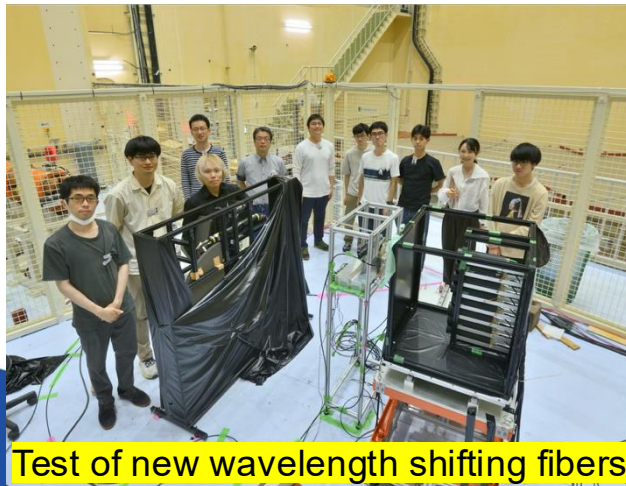
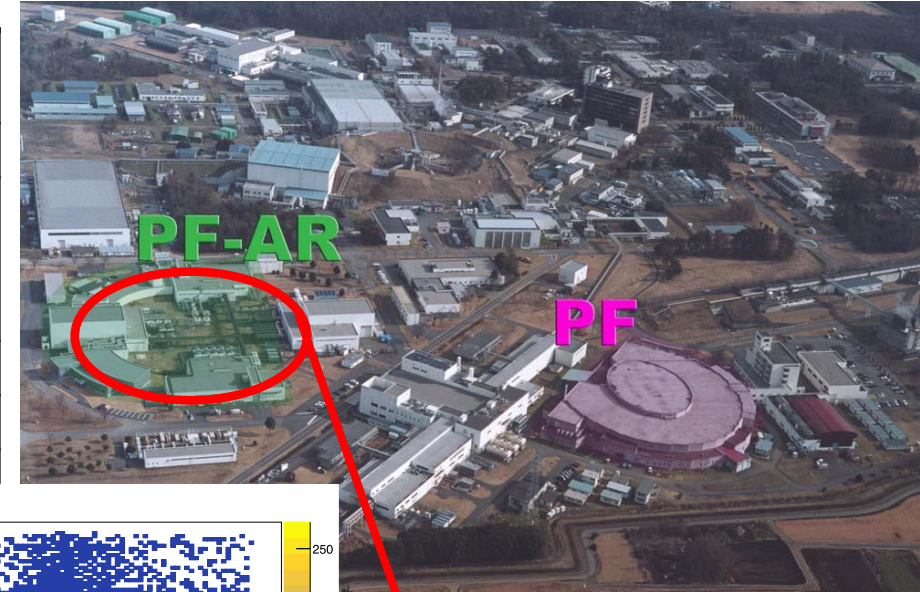


Aiming to develop rad-hard sensors

2. Electron Test Beam Line is ready

- It is designed to provide **electron beams ranging from about 0.5 GeV to 6.5 GeV for the purpose of testing detectors.**
- Beam operations for users are typically conducted during the period of May-Jun, October-December, and February-March each year.
- Beam time is planned to be available during shutdown periods a CERN and FNAL (i.e. 2026-2029).**
- If you are interested, please contact ITDC test beam line at artbl-secretariat@ml.post.kek.jp

Statistics	FY 2023	FY 2024
Number of Experiments	17	21
Total number of Users	150	201
Students (among them)	79	102
Foreign users (among them)	17	41
Conference Presentations	35	40
Dissertations	16	15
Publications	1	1



3. Quantum technology R&D

All KEK has Synergy based on "Quantum"
Core is QUP (Q center)

Private Companies
+ Labs



Application
Sensor
Q-Connection

academic-
industrial
Collab. office



Q-Sensor
Basic Science



Quantum
Material
using
multibeam

Mat.Lab



PP Lab



Accl. /Workshop
Labs



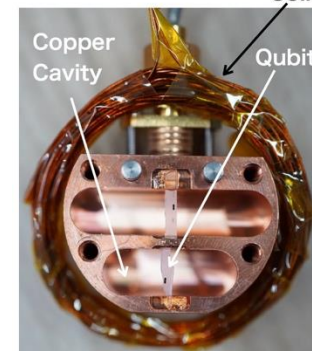
CryoCMOS
Cryo technology
Q-Memory with
SC Cavity $Q > 10^{11}$

Study Q Material
(Various Quantum
beams probe spin/state
of atom, electron, nuclear)

Sensor for Basic Science
Gravity
Q-Connection
Dark Matter detection



Toshi.Azuma is
new director of QUP



Q-bit as Sensor
GW detector
Laser ...

International Collaboration



ASPIRE



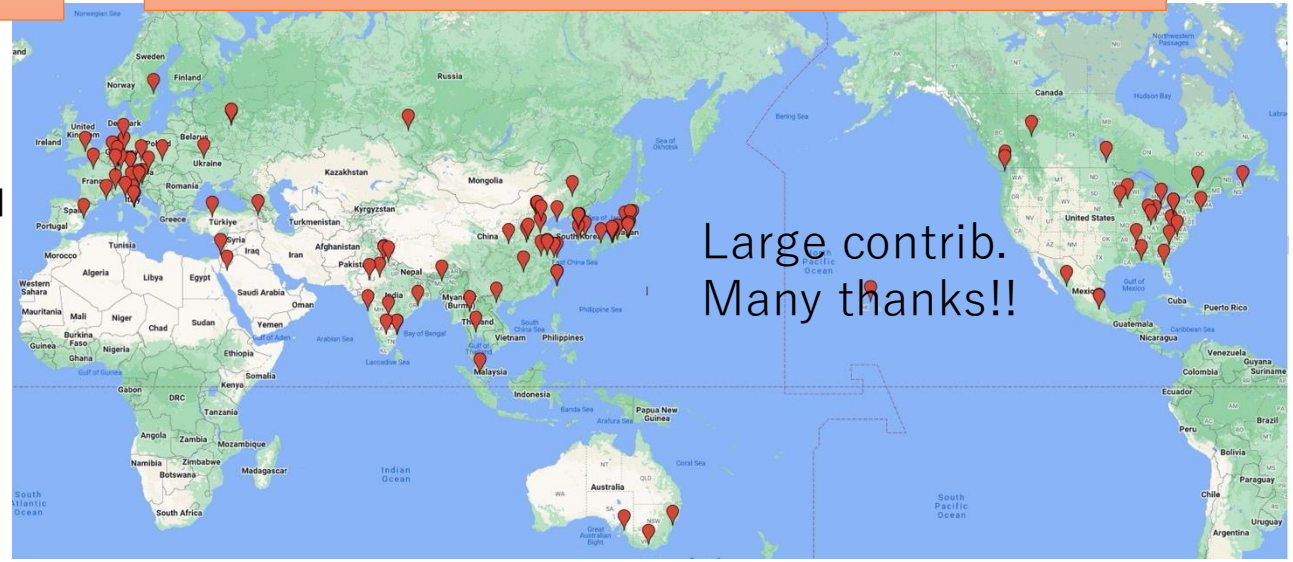
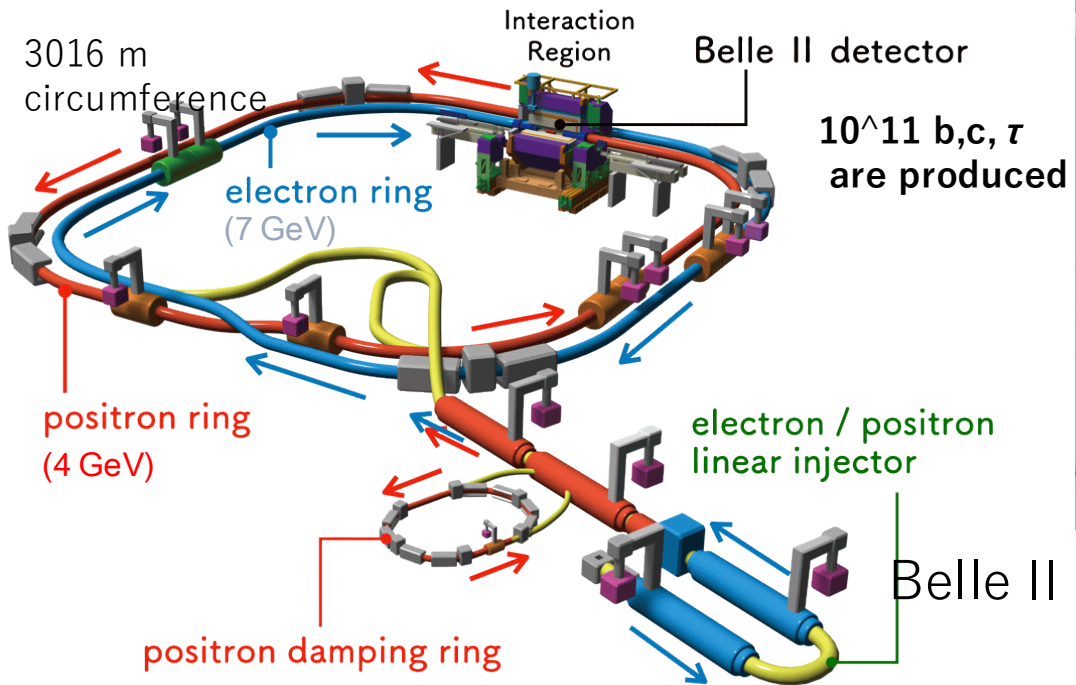
Insight through Accelerators.



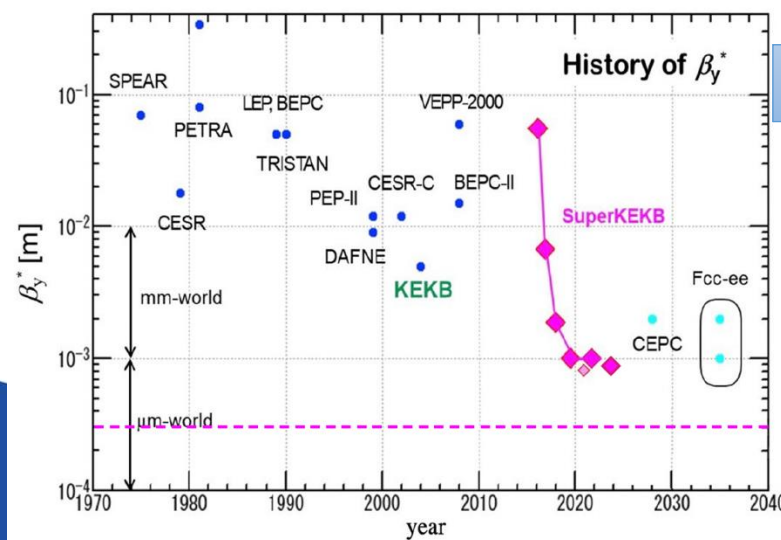
We OPEN Research Positions

Proj 1 SuperKEKB / Belle II

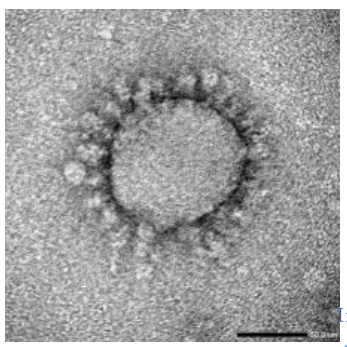
The world-highest Luminosity was recorded $5.1 \times 10^{34} \text{ cm}^{-2} \text{ s}^{-1}$ (Dec. 2024)



Belle II Collaboration: **>1200 members from 28 countries**



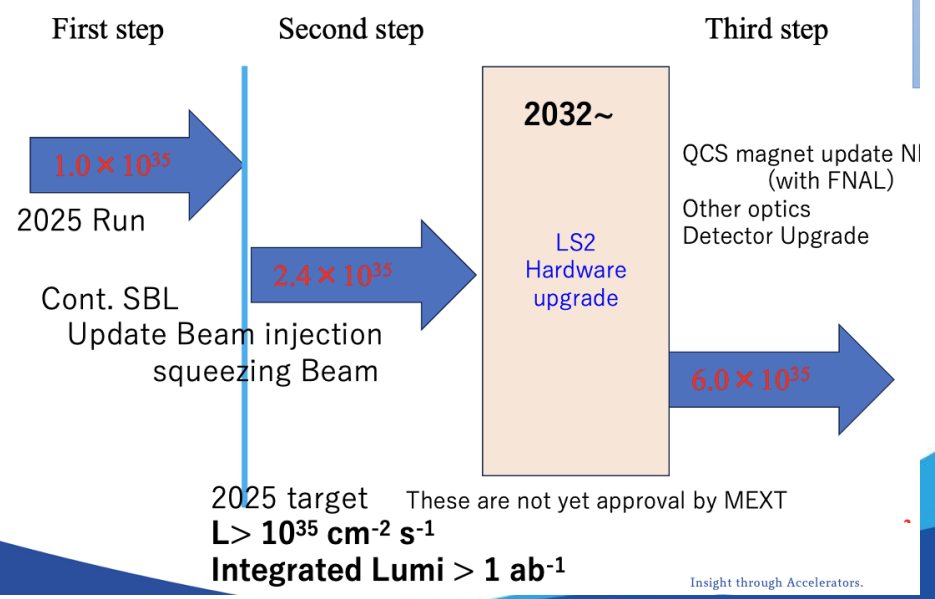
Nano-beam



Insight through Accelerators.



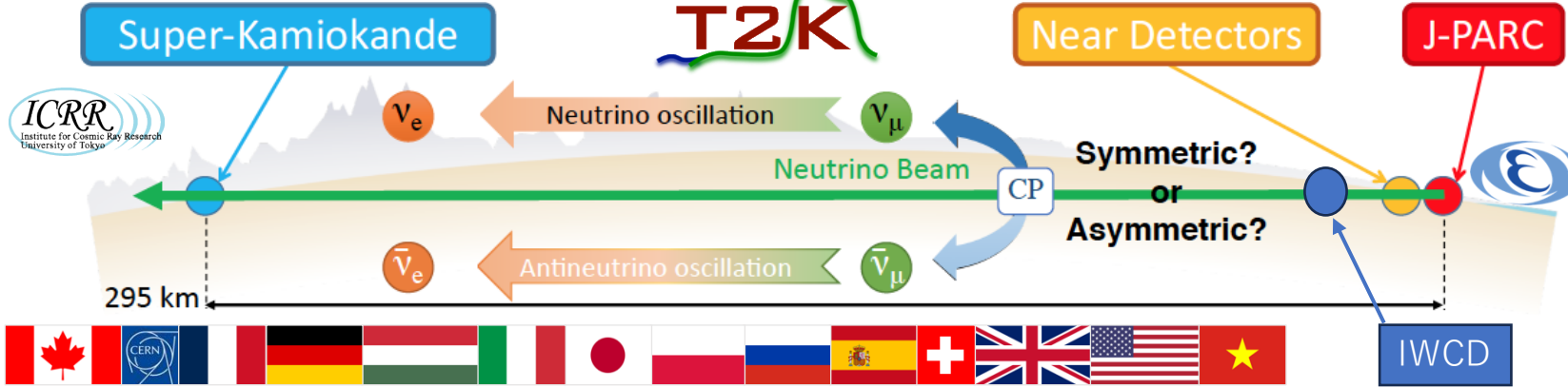
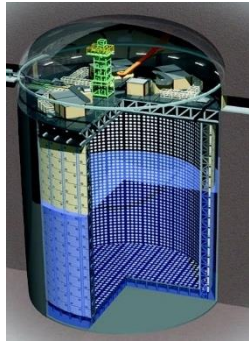
Detector UG
MDI UG
around 2032



Insight through Accelerators.

Proj 2. J-PARC (T2K+HK)

Interesting hint of Neutrino CP violation is obtained.
 Neutrino / Anti-neutrino 10^{19} / day are produced @ JP
 emitted to SK/HK (300km away)

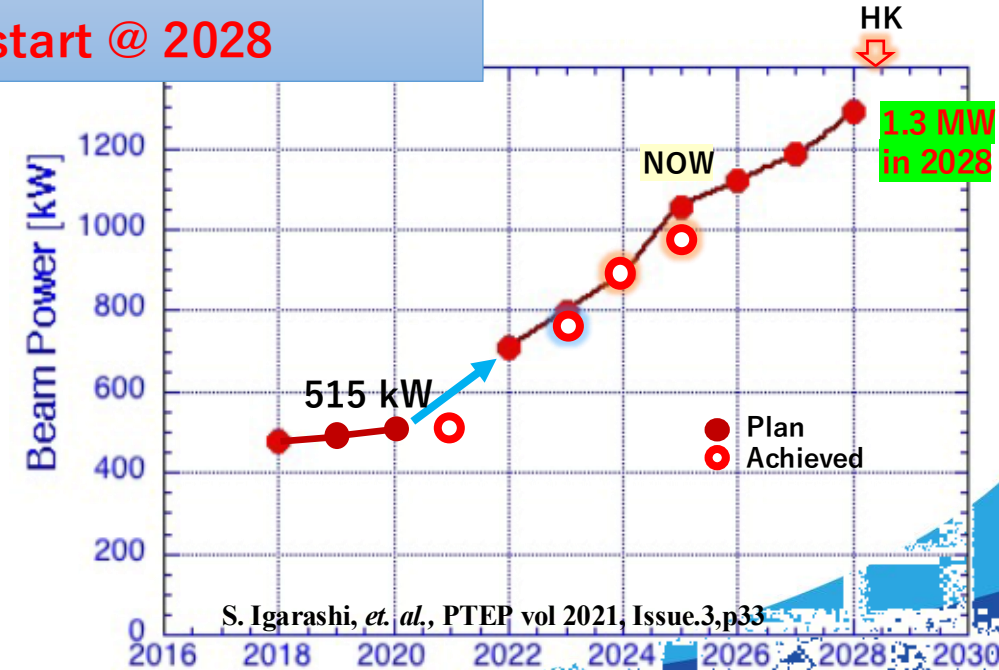


~560 members, 74 Institutes, 15 countries (incl. CERN)



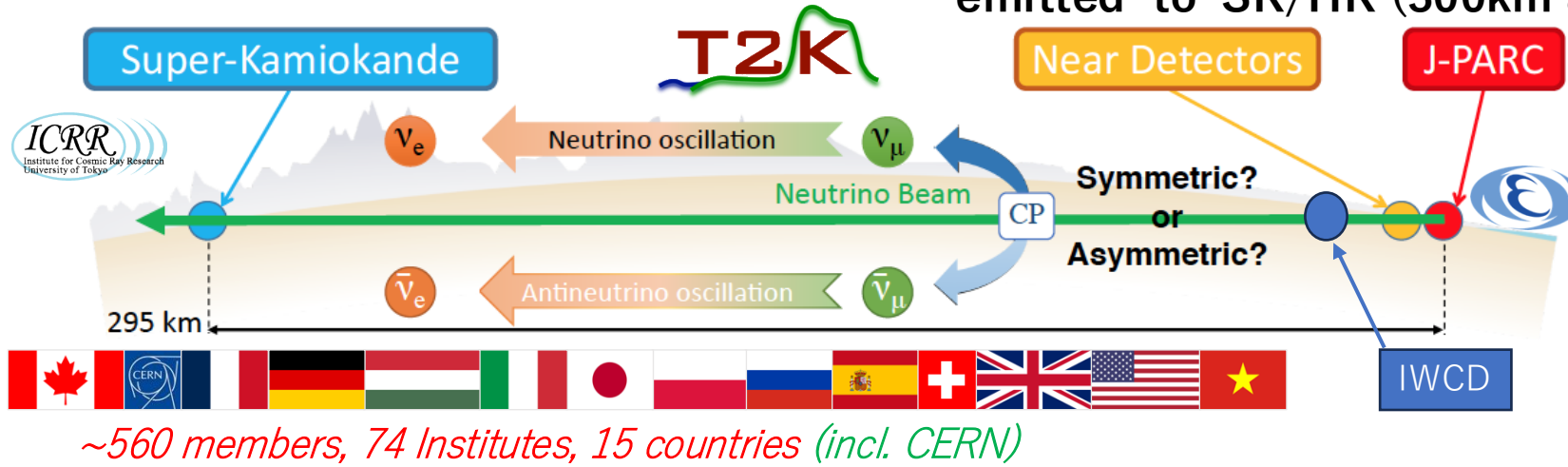
SK / HK

All schedule / budget are under Control.
 Aiming data taking start @ 2028

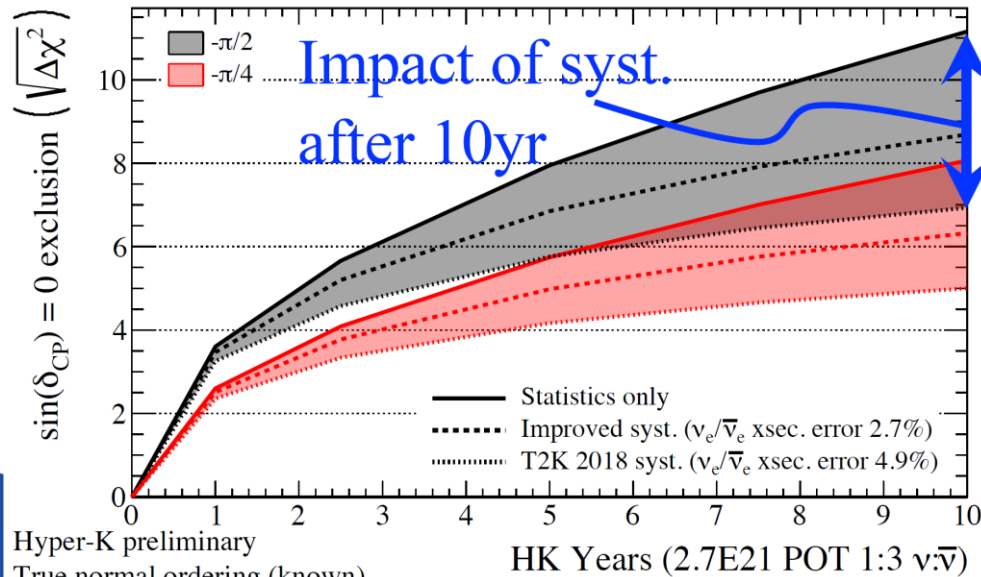


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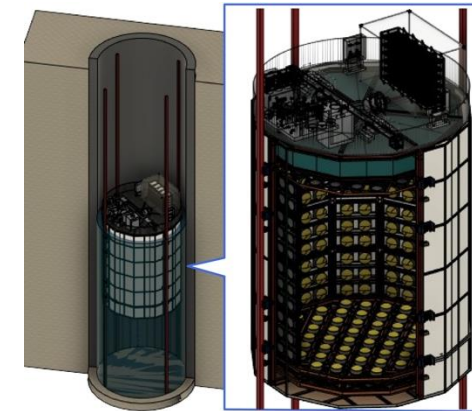
δ_{CP} Projected sensitivity to CPV



$\sin^2(\theta_{13}) = 0.0218$ $\sin^2(\theta_{23}) = 0.528$ $|\Delta m_{32}^2| = 2.509E-3$

IWCD (Mini-Kami) is Key to reduce systematic error:

Start Construction



Let's join IWCD
 Ai/ New approach are welcome

Current situation in the real world is not good for us.

Most important thing is

- International collaboration
- Exchange of younger generation

