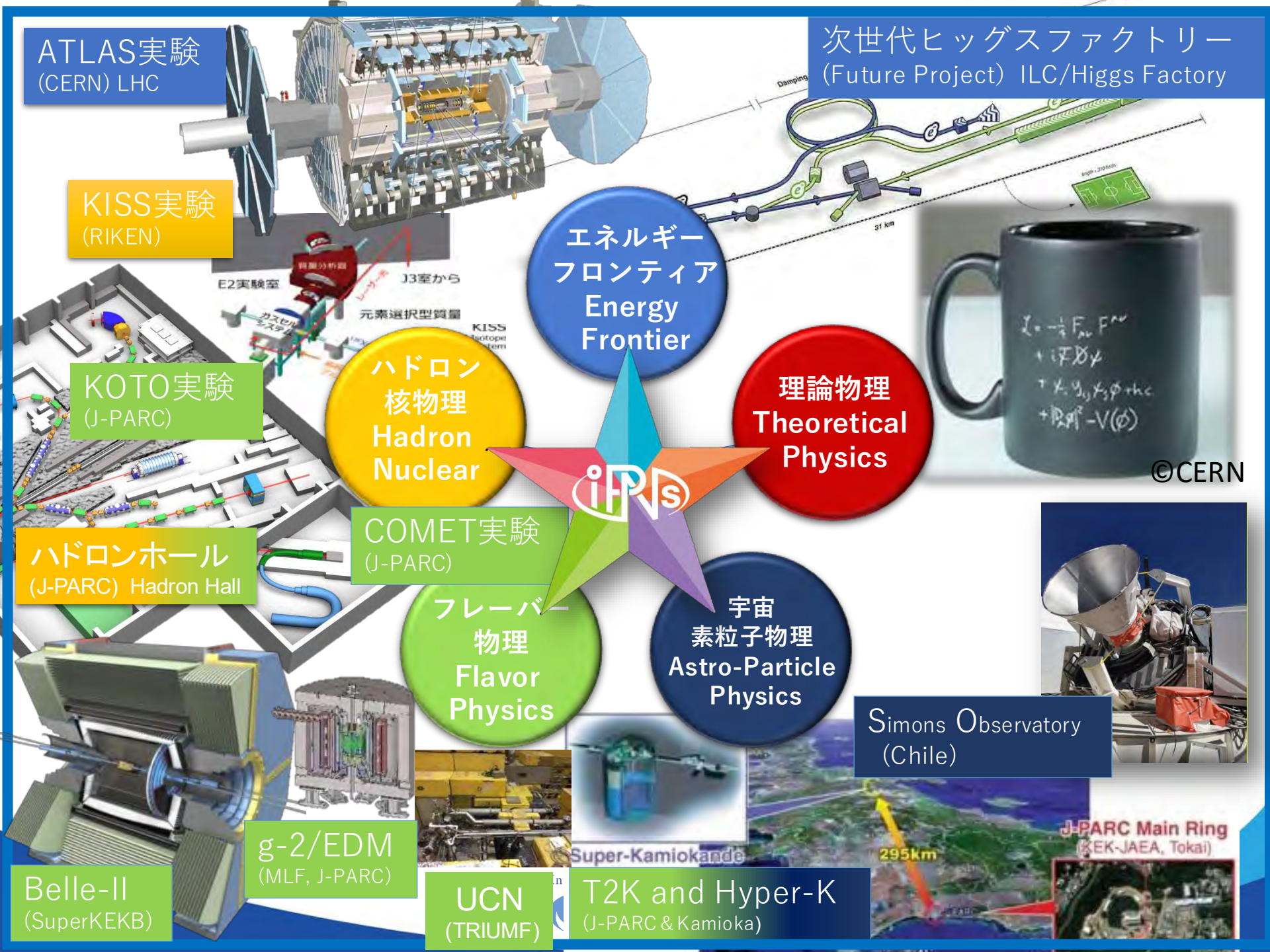

KEK
iFNs
Institute of Particle and Nuclear Studies
KEK Report
Joint workshop of TYL/FJPPN and FKPPN 2026
Hamamatsu, May 19, 2026
Naohito SAITO
Tsukuba Campus
大強度陽子加速器施設
J-PARC
Tokai Campus


ATLAS実験
(CERN) LHC
次世代ヒッグスファクトリー
(Future Project) ILC/Higgs Factory
KISS実験
(RIKEN)
エネルギー
フロンティア
Energy
Frontier
ハドロン
核物理
Hadron
Nuclear
理論物理
Theoretical
Physics
KOTO実験
(J-PARC)
iPNS
©CERN
ハドロンホール
(J-PARC) Hadron Hall
COMET実験
(J-PARC)
フレーバー
物理
Flavor
Physics
宇宙
素粒子物理
Astro-Particle
Physics
Simons Observatory
(Chile)
g-2/EDM
(MLF, J-PARC)
Belle-II
(SuperKEKB)
UCN
(TRIUMF)
T2K and Hyper-K
(J-PARC & Kamioka)
Super-Kamiokande
295km
J-PARC Main Ring
(KEK-JAEA, Tokai)

IPNS Organization 2025

https://www2.kek.jp/ipns/ja/about_ipns/organization/

素粒子原子核研究所
Institute of Particle and Nuclear Studies

IPNS Steering Committee

IPNS Research Planning Committee

IPNS Leaders Association

Directorate
Director: SAITO, Naohito
Assistant: HONDA, Yuko
Deputy Director:
USHIRODA, Yutaka
KOMATSUBARA, Takeshi
TOMOTO, Makoto

Administration Office

PR Team
KIKUCHI, Mako

Engineering Coordinator
KAWAI, Masanori

Engineering Counselor
TANAKA, Nobuaki
FUJITA, Yoichi
MAKI, Muneyoshi
HIROSE, Erina

Theory Center
Head
HASHIMOTO, Shoji

Wako Nuclear Science Center
Head
WATANABE, Yutaka

Instrumentation Technology Development Center
Head
TOMOTO, Makoto
- Mechanics
- Electronics System
- Cryogenics

Energy Frontier
OIDE, Hideyuki

Belle
NAKAO, Mikihiko

Neutrino
NAKADAIRA, Takeshi

Hadron
(Primary BL +Strangeness +KOTO + High-p +COMET)
TAKAHASHI, Hitoshi

CMB
HASEGAWA, Masaya

Muon and Neutron
MIBE, Tsutomu

Computing
HARA, Takanori

Safety
ADACHI, Ichiro

Directorate, Center/Group Leaders, and Admin Office of FY 2025

erators.
EK

Goal of each Group and Center

- Energy Frontier
  - Advance existing data analysis
  - Preparation for HL-LHC
  - Future detector R&D
- Belle II
  - Operation exceeding four months
  - Integrated Luminosity > 1/ab
  - Peak Luminosity exceeding 1E35
  - Preparation for LS2 upgrade
- J-PARC Particle & Nuclear Physics
  - Neutrino
    - Physics run with stable beam power exceeding 1 MW
    - Preparation for LS and aging countermeasures planned for FY2026
    - Completion of beamline upgrade (compatible with 1.3 MW)
    - Accelerate IWCD construction
  - Hadron
    - Delivering results from user experiments
    - Aging countermeasures and facility strengthening
    - Facility improvements
  - New initiatives
    - COMET: Preparation for Phase-1 low-intensity run
    - g-2/EDM: Facility design revision and muon beam acceleration
- Wako Nuclear Science Center
  - Strengthening coordination among Wako, Tsukuba, and Tokai campuses
  - Facilitating inter-campus mobility
  - Collaboration with Muon and Neutron Groups is promoted
- Theory Center
  - Driving exploration of new research themes
- TUCAN (Muon & Neutron Group)
  - Strengthening collaboration with the domestic neutron community
- Strengthening within-IPNS and KEK-wide Collaboration
  - IPNS – iTDC
  - Collaboration with QUP and IMSS, and of course Accelerator and Applied Research Lab

Timeline Updates (draft) 24-Feb-2026

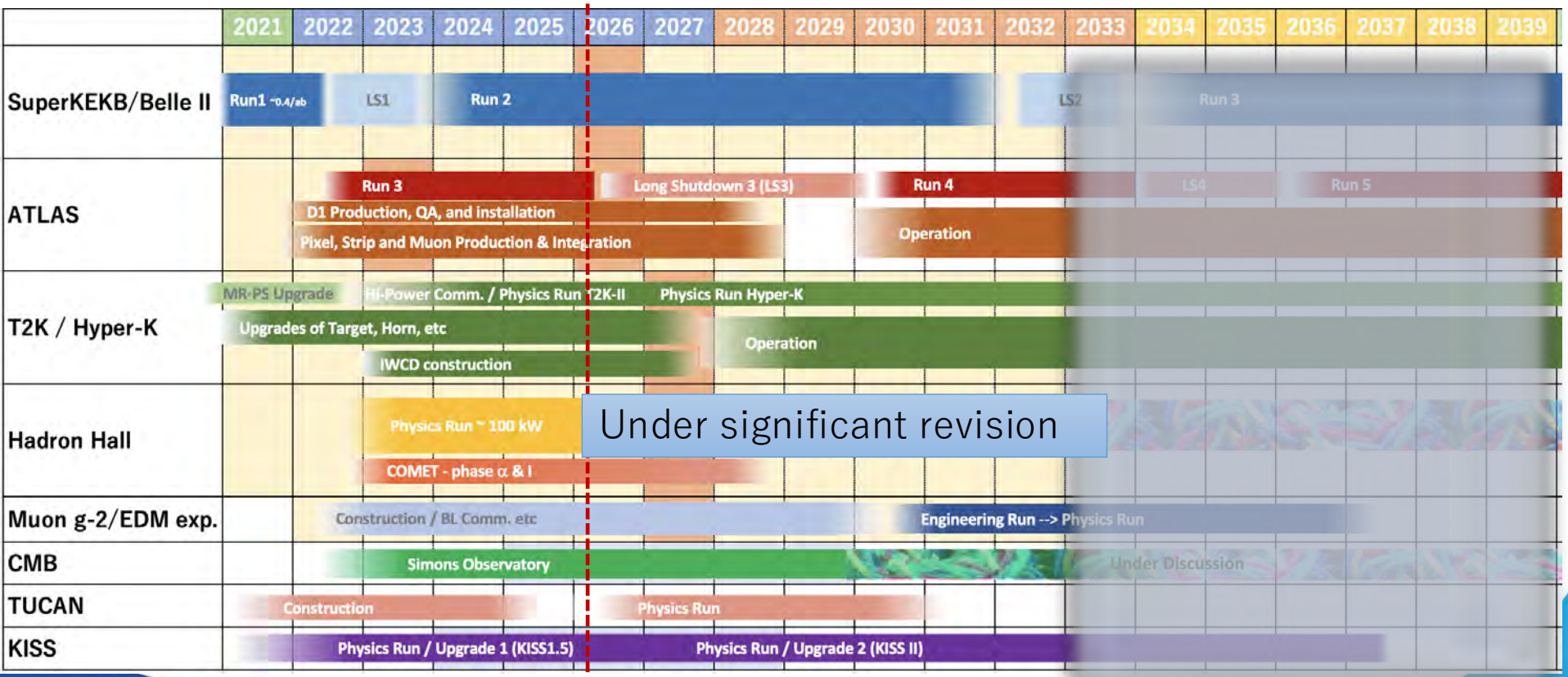
- Intended timeline by IPNS

Covered by the Large Scale Academic Frontier Funding of MEXT

Year of Mid-term Review

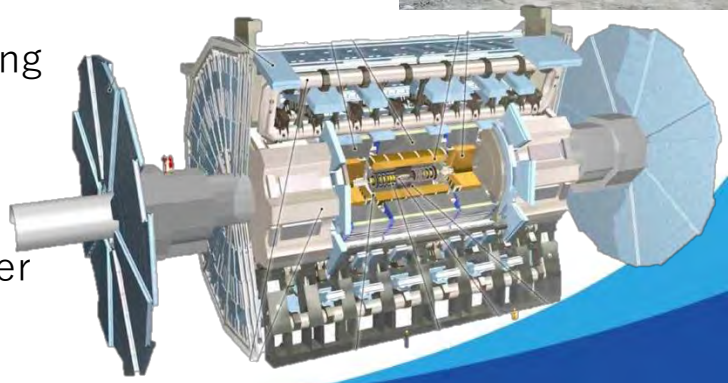
We are here

Later years are still in discussion



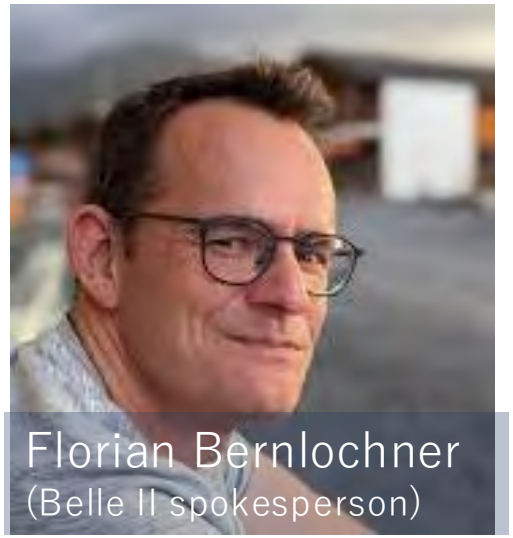
Executive Summary

- Steadily progress of the BIG 3
  - SuperKEKB/Belle II towards Integrated (1/ab) then peak Luminosity
  - T2K/Hyper-K Smooth transition from T2K to HK
  - LHC Run 3 and HL-LHC Physics outputs from Run3 and and preparation for H-LHC
- Coordination and Alignment of “New” Projects
  - Strategic promotion of COMET; aiming for low intensity run in 2028
  - Muon g-2/EDM experiment: Two-stage building construction plan adapted
  - Direction of HEF-ex plan : focus on pi20/mu20 and test beamlines as an initial step
    - Space Application Project is newly Funded!
  - TUCAN produced UCN to be ready fro nEDM measurement
  - KISS 1.5 is ongoing well
- Other smaller projects and theory
  - New directions are being discussed
  - A new group/center for Fundamental Symmetries is being promoted
    - Muon and Neutron group and Wako Nuclear Science Center
- Future planning group started
  - Primary focus is on the Tsukuba campus; Led by younger generation



SuperKEKB and Belle II

- New generation of leadership is identified and more coherent actions under entire SuperKEKB and Belle II team have been encouraged.



In addition, organizational structure change is under discussion with a strong leadership of DG to encourage One Team Efforts to achieve the goal!

Shoji UNO as an assistant to DG for Lumi Improvement

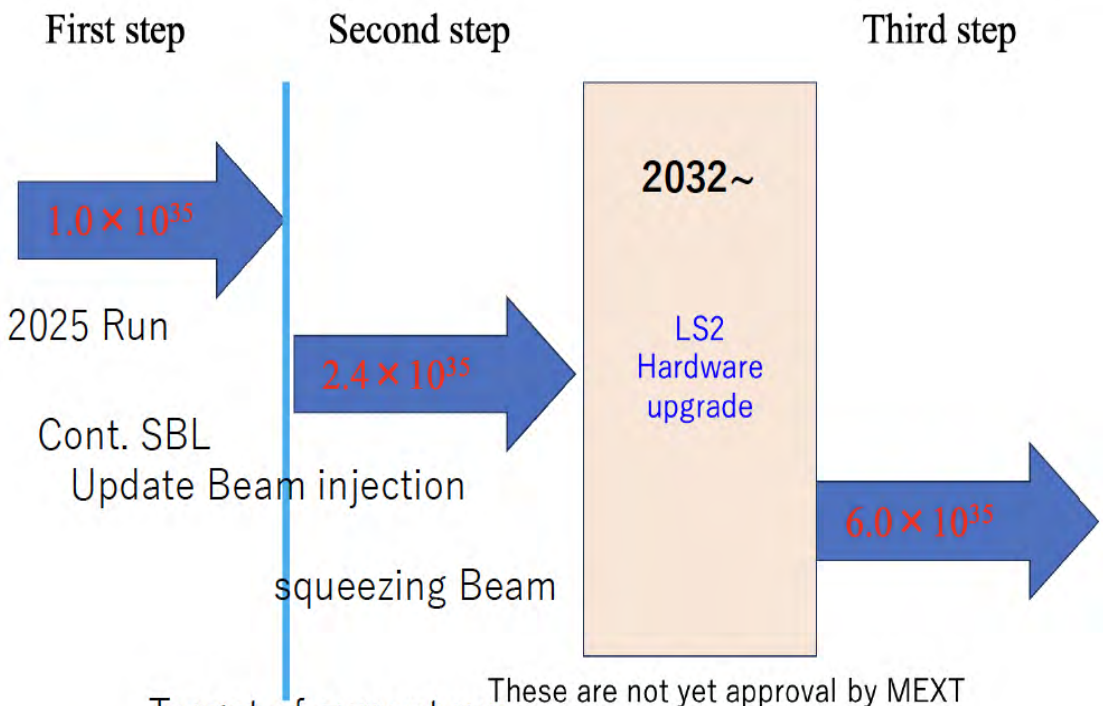
SuperKEKB / Belle II

Plan of SuperKEKB

New Trials
- **Beam current**
- **Squeeze Nano-beam**

Collaborate with CERN FCCee group

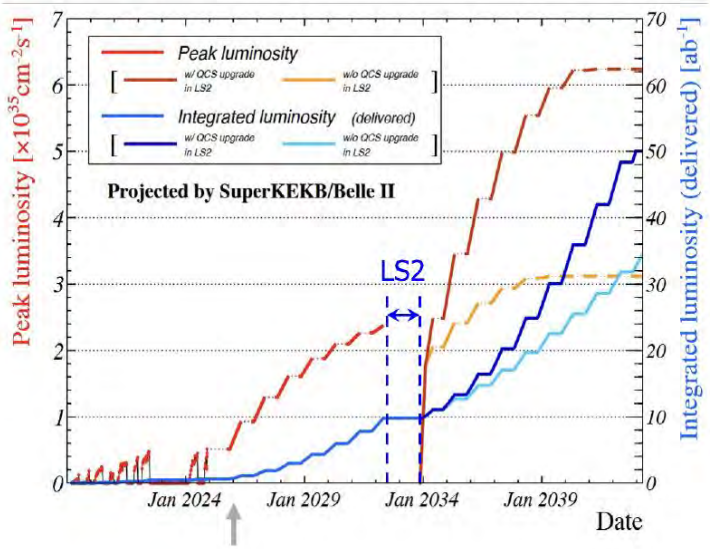
Three steps are considered.



Target of current run
Integrated Lumi > 1 ab^{-1}
L> 10^{35} cm^{-2} s^{-1}

- **Beam-beam interaction** is important / crucial topics of frontier

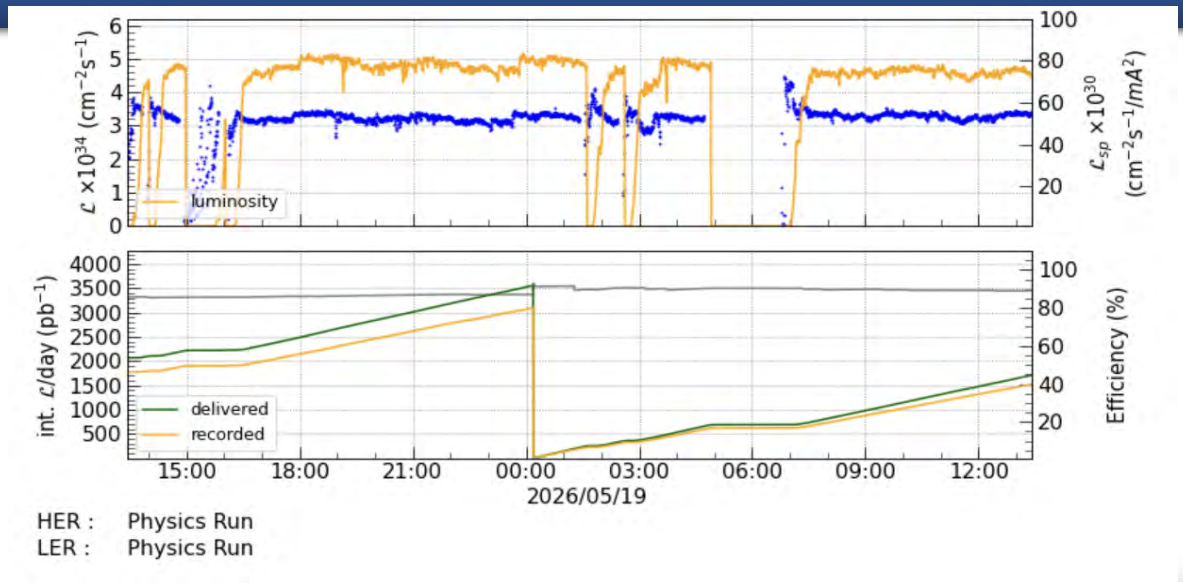
The international collaboration with CERN, DESY(injection), IHEP has started to study the beam-beam interaction

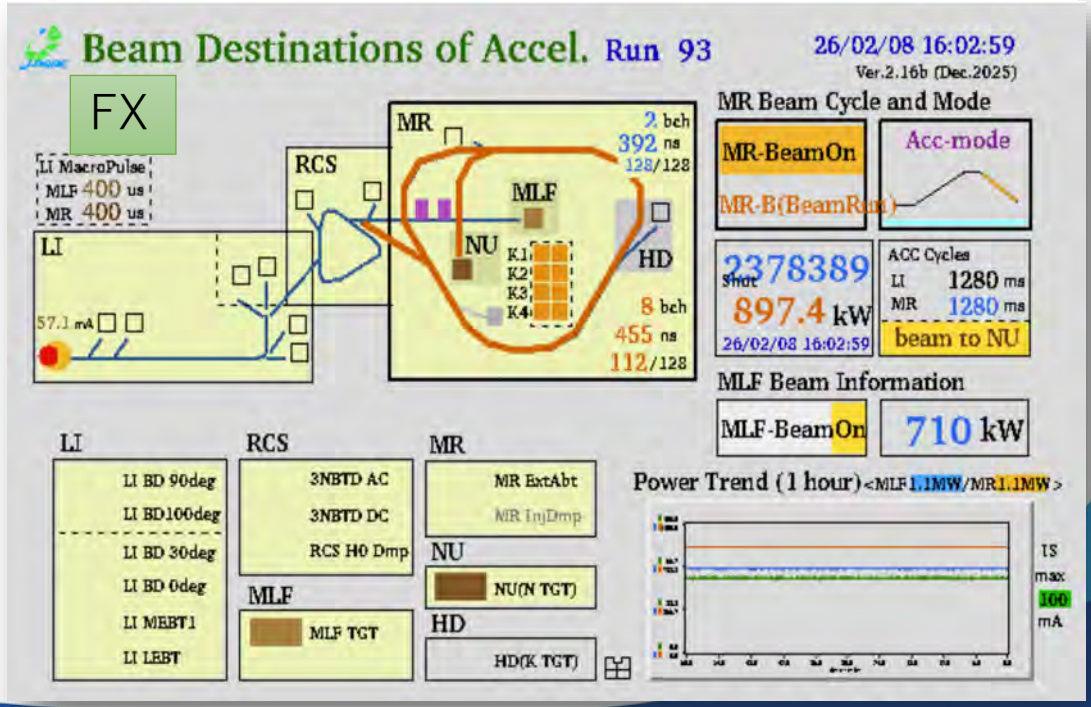


Insight through Accelerators.
KEK

NoBeam NoLife 2026

- SuperKEKB / Belle II
  - Accumulating Physics Data towards 1/ab
  - The WR of Peak Lumi updated
- J-PARC
  - FX run continues with ~ 900 kW with new working point.
  - Aiming for stable operation > 1 MW





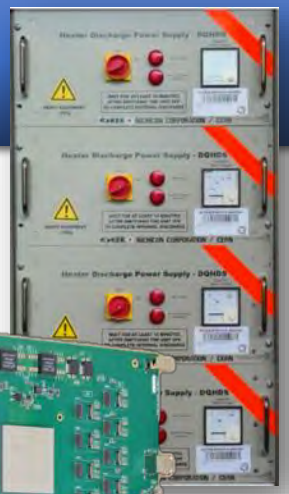
Hyper-K as a next flagship

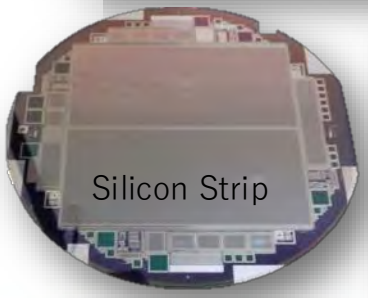
- Rapid improvements on the J-PARC facility are ongoing, and finally the IWCD construction started.

- Reinforcement of cooling and water systems
- Expansion of remote handling capability
- Upgrade of primary beamline components

ATLAS and HL-LHC

- HL-LHC Accelerator
  - Superconducting beam-separation dipole magnet D1
  - Quench protection heater power supplies (Additional Contribution 1)
  - RF power and distribution system for crab cavities (Additional Contribution 2)
- ATLAS Experiment
  - Inner Tracker
    - Silicon strip detector
    - Silicon pixel detector
  - Muon trigger detector
    - Trigger electronics
  - Leveraging Japan's technological strengths in collaboration with industry
    - Hitachi for magnets,
    - Hamamatsu Photonics for silicon sensors





Trigger DAQ Upgrade
- 1 MHz Level-0 trigger
- 10 kHz thruput event filter (EF)

Electronics Upgrade
- LAr EM Calorimeter, Tile Hadron Calorimeter
- 40 MHz continuous readout

High Granulated Timing Detector (HGTD)
- Detect charged particles in 2.4 < | η |< 4 with 30 ps
- LGAD silicon pad detector
- Suppressing pile-up collisions, measurement of bunch luminosity

full silicon inner tracker (iTk)
- Barrel; pixel 5 lyrs + strip 4 lyrs covering | η |< 4
- Full silicon; # of Hits/track >= 9 in most of | η | region
- Finer z-special resolution to reduce pile-ups
- Reduced material budget

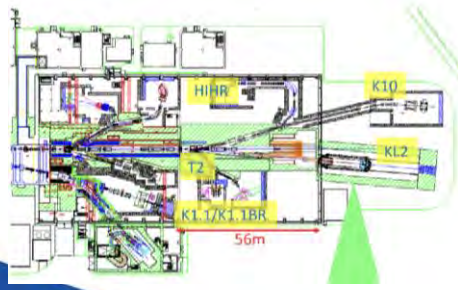
New Muon Chamber
- Cover Barrel/Endcap region (RPC, sMDT,TGC)
- Improving Trigger efficiency and momentum resolution
- Eliminating fake rate

Collaborating Institutions:
U of Tokyo, U of Tsukuba, Waseda U, I Science Tokyo, Ochanomizu U, Tokyo Metropolitan U., Shinshu U., Nagoya U. Kyoto U., Osaka U., Kobe U., Kyushu U.

As a world unique Kaon Facility

- XIII International Conference on Kaon Physics was held in Mainz, 8-12, September
- KOTO II workshop were held right after, and J-PARC hadron group actively participated.

J-PARC KOTO II (E107) (scientifically approved)



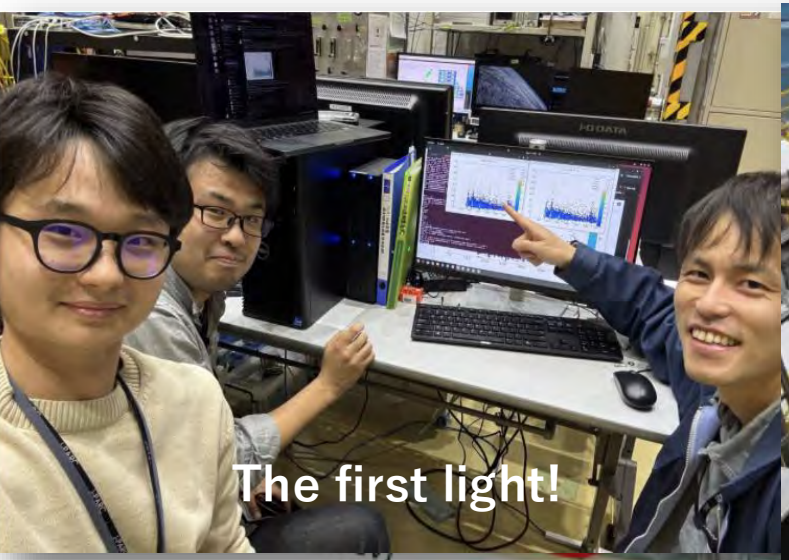
Measure branching ratio of the $K_L \to \pi^0\nu\nu$ decay with
-Higher intensity K_L beam
-Larger detector

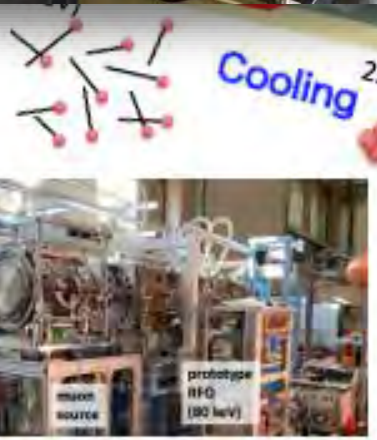
- ~35 SM events for 3×10^7 s run time with 100kW beam
- Signal-to-background ratio ~ 0.9

- $Br(K_L \to \pi^0\nu\nu) \fallingdotseq SM$
  → >5σ observation
- $|Br(K_L \to \pi^0\nu\nu)-SM|/SM > 40\%$
  →Indication of new physics

Muon g-2/EDM; Muon source

- Building construction is now in two phases, for an early realization.
- A dedicated laser system is build; the first light has proved its potential !

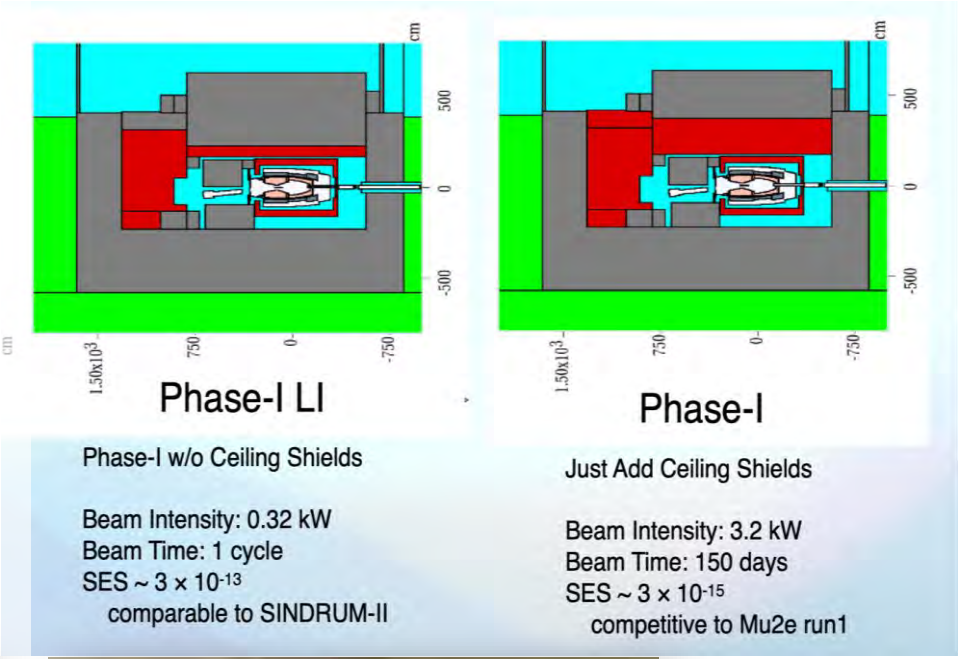


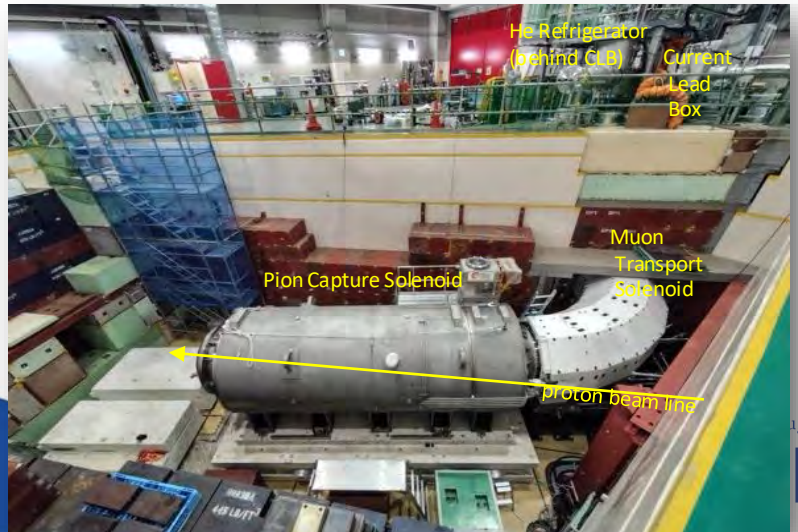


First-ever muon acceleration in 2024
Aiming for data taking from 2028 → 2030

A plan of COMET; Phase 1 and beyond

- Review was held in July, 2024
  - Chaired by Augusto Ceccuci.
  - Review Report is available at
  - “The collaboration and the Lab should work closely to realize the phase-1 LI”
- Four conditions to move further
  1. Minimize the remaining cost to complete the Low Intensity mode of phase-1 (currently 2.83 Oku-yen)
  2. Organization of the Collaboration management should be improved among and outside of the collaboration
  3. Gain good understanding of community
  4. Negotiate with J-PARC to utilize the operation budget to cover remaining cost
- All steps are in progress





Collaboration with Foreign Labs on Muon

- As a part of the efforts, we held BRIDGE workshop with PSI in Tokyo, October 20-22, 2025.

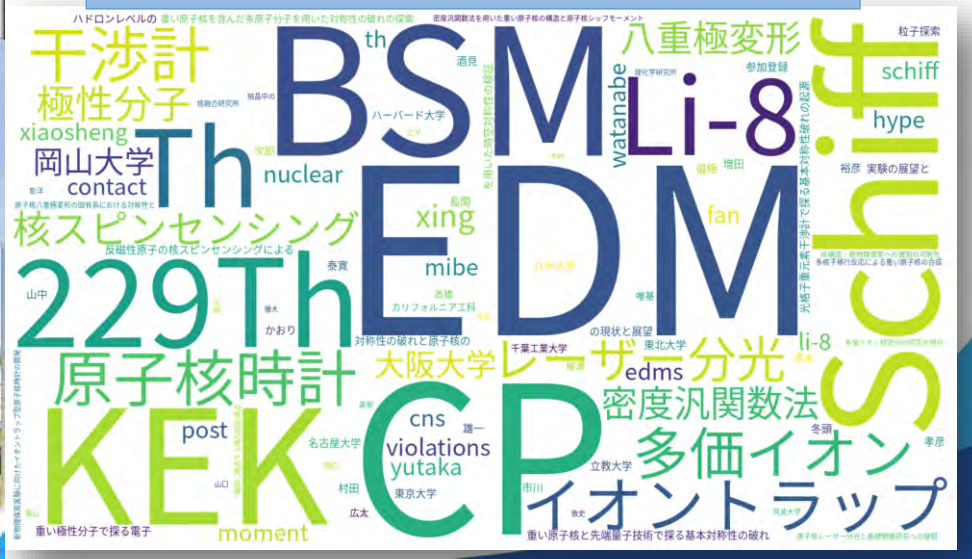
Inter-IPNS Collaboration: Workshop on Fundamental Symmetry

March 18 and 19, 2026

https://conference-indico.kek.jp/event/357/overview

- Exploring Fundamental Symmetry Violation with Heavy Nuclei and Advanced Quantum Technologies
  - **Survey** the current status and future prospects of fundamental symmetry violation studies using heavy nuclei and advanced quantum technologies.
  - **Explore** new directions and opportunities in electric dipole moment (EDM) research.
  - **Connect** leading theory and experiment in atomic, molecular, and nuclear precision studies (including nuclear clocks).
  - **Clarify** the future physics reach and key technical bottlenecks.
  - **Define** strategic priorities for the next stage of research.

Word cloud based on the WS program.



Revision of HEF-ex plan; Collaboration with Universities

Enhancement and Diversification of the Hadron Hall

K1.8BR Upgrade
- K mesons: 1.6× increase
- Promote user programs through major upgrades and intensification of the beamline spectrometer

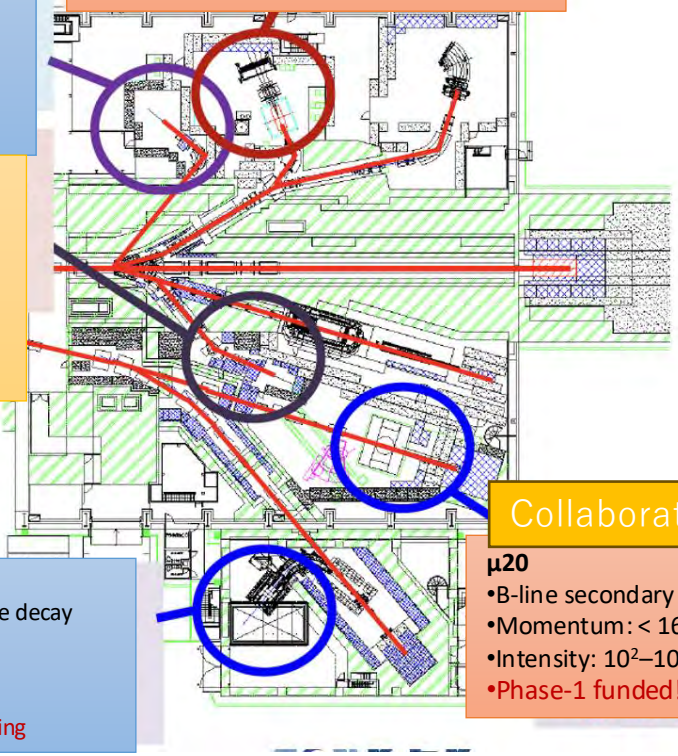
Collaboration with RIKEN

Collaboration with iTDC

π1.0
- Test beamline
- Momentum: < 1.0 GeV/c
- Intensity: ~10^7 π/s
- Promoted in collaboration with ITDC

Collaboration with QUP, JAEA

SP
- Facility for irradiation tests for space applications
- Momentum: 1.1 GeV/c
- Intensity: ~10^8 π/s
- FUNDED for space irradiation experiments



While there is strong interest within the community in pursuing a full-scale extension (HEF-ex), we have decided to focus instead on enhancing the functionality of the Hadron Hall in order to accumulate substantial scientific output.

COMET
- Muon beam dedicated to rare decay searches
- Momentum: < 150 MeV/c
- Intensity: ~10^8 μ/s (Phase-1)
- Applied to "MoonShot" funding

Collaboration with Osaka U.

μ20
- B-line secondary (tertiary) beamline
- Momentum: < 16 GeV/c
- Intensity: 10^2–10^3 /s (Phase-1), 10^4–10^5 /s (Phase-3)
- Phase-1 funded!

Revision of HEF-ex plan; Collaboration with Universities

A slide by S. NAKAMURA (U Tokyo)

International Quantum Physics Network (IQPN)

Established in 2025 through inter-university collaboration in Japan

Through inter-university collaboration, we are building a cooperative framework with Japan's world-class accelerator facilities, J-PARC and RIBF, to continuously advance research related to the EIC project on an all-Japan basis

Systematizing and standardizing the research and technological capabilities of small laboratories at Universities
→ establishing a sustainable hub to lead large-scale experiments

Satellite office to be established — Brookhaven National Laboratory — Jefferson Lab

Joint Research Agreement between QNSI UTokyo and RIKEN Nishina Center

Quark Nuclear Science Institute, UTokyo

- Promotion of international standardization of data analysis methods and semiconductor sensors
- Serving as a gateway for large-scale international collaborations in the U.S., including the EIC project
- Establishment of a user support framework: creation of Technical Development and overseas satellite offices (with international research hubs at BNL and JLab)

Research Center for Accelerator and Radioisotope Science, Tohoku Univ.

- Quantum Measurement Technology Development Center utilizing accelerator beams
- Application of cutting-edge quantum measurement techniques to interdisciplinary fields

HIROSHIMA UNIVERSITY

Hiroshima Univ.

- Quantum Measurement
- Technology Development Center based on an Advanced Cleanroom

QNSI

RARiS Tohoku University

University of Tsukuba

RCNP

Research Center for Nuclear Physics, Osaka Univ.

- International standardization of advanced data acquisition systems
- Establishment of the user support organization "EIC-J Consortium"
- Launch of a new division for the formation of a Quantum Beam Center of Excellence

Univ. of Tsukuba

- Establishment of an international research and education hub at CERN, Europe
- Serving as a gateway for large-scale international collaborations with Europe

Wako Nuclear Science Center

- The center is exploring the Nuclear Chart with KISS and now KISS1.5 (x 100 or more compared to KISS).

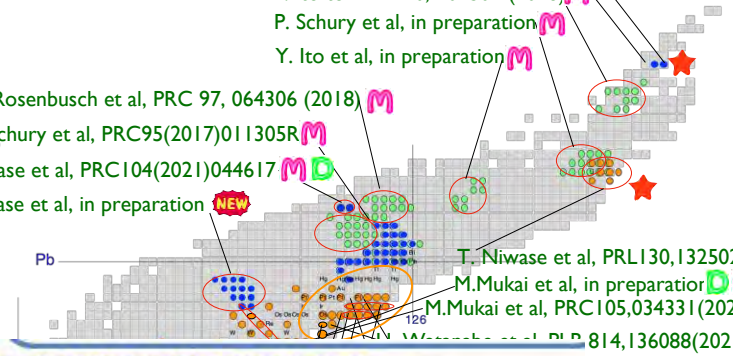
Wako Nuclear Science Center

2.Comprehensive Mass measurements @KISS, GARIS, BigRIPS-SLOWRI

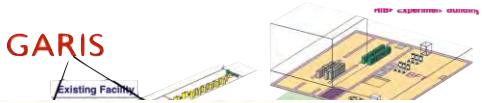
Recent Press Releases

- First mass measurement of SHE (Db@GARIS)
- Discovery of new n-rich uranium isotope(@KISS)
- Disappearance of n=34 magic(Ti, V@BigRIPS-SLOWRI)

P. Schury et al, in preparation NEW
P. Schury et al,PRC104,L021304(2021)
Y. Ito to PRL 120, 102501 (2018)
P. Schury et al, in preparation
Y. Ito et al, in preparation
M. Rosenbusch et al, PRC 97, 064306 (2018)
P. Schury et al, PRC95(2017)011305R
T. Niwase et al, PRC104(2021)044617
T. Niwase et al, in preparation NEW



T. Niwase et al, PRL130,132502(2023 NEW
M.Mukai et al, in preparation NEW
M.Mukai et al, PRC105,034331(2022) NEW



理研RIBF施設内の使用装置

- KISS (元素選択型質量分離装置)
  KEK共同利用を実施
- CRISMASS (停止低速RI精密質量分析システム)
  理研との共同研究を実施

R6	R7	R8	R9	R10	R11	R12	R13	R14
KISS物理実験								
KISS-1.5建設								
	コリニアレーザー核分光装置開発							
				KISS-1.5アップグレード				
網羅的精密核分光(KISS, GARIS, SLOWRI)								

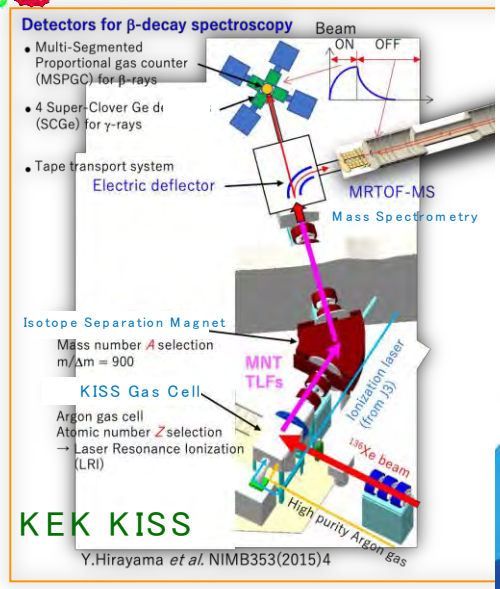
1. KISS Operation
(KEK Isotope Separator System)

Unique & 1st ISOL facility using MNT reactions

Provides n-rich isotopes of refractory elements

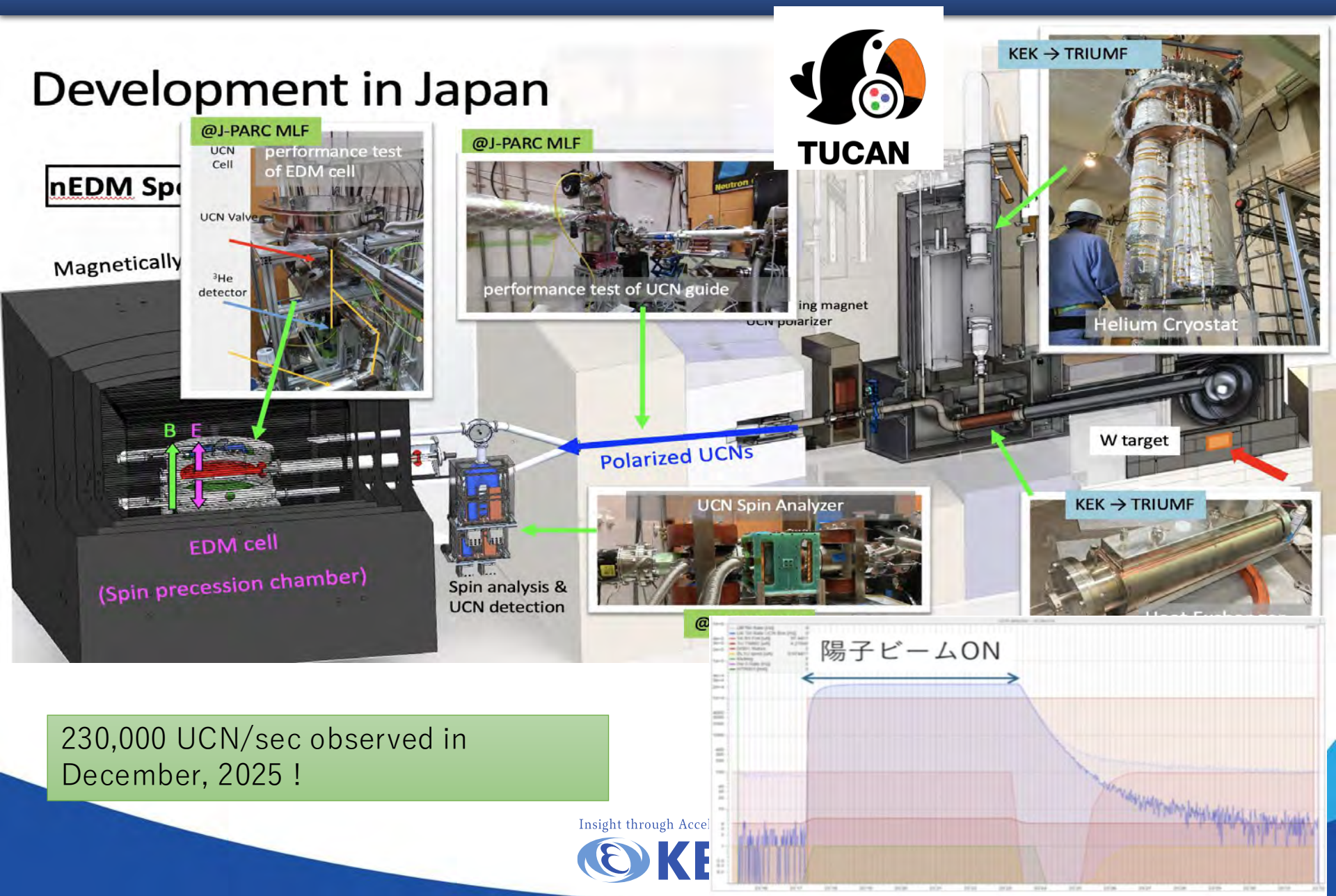
KISS Experiments in FY2023

- M. Mukai (Nagoya U.), "Isotope shift measurements of neutron-rich Hf and W isotopes"
- Y. Hirayama (KEK), "Study of prolate-oblate shape transition in $^{188-193}$Re by in-gas-cell laser ionization spectroscopy"
- P.M. Walker (Surry U.), "Multi-quasiparticle Isomers in neutron-rich ^{183,184}Hf"
- Y. Hirayama (KEK), "Half-life and mass measurements of nuclei around N = 126 using KISS"
- Y.X. Watanabe (KEK), "Mass and lifetime measurements of neutron-rich actinide isotopes toward r-process termination"



UCN nEDM

TUCAN experiment at TRIUMF



230,000 UCN/sec observed in December, 2025 !

CMB B-mode – NEXT

@KEK, Tsukuba – Seminar Hall Building 3
January 27-29, 2025

Scientific Organizing Committee:
Masaya Hasegawa (KEK-IPNS & QUP), Guillaume Patanchon (APC), Hirokazu Ishino (U Okayama), Hiroki Akamatsu (QUP & SRON), Yuji Chinone (QUP) Tijmen de Haan (KEK-IPNS & QUP), Tommaso Ghigna (QUP & IPMU)

CMB-INFLATE is a Marie Skłodowska-Curie Actions (MSCA) Research and Innovation Staff Exchange (RISE) H2020 project.

素粒子原子核研究所
Institute of Particle and Nuclear Studies

研究拠点形成事業
Core-to-Core Program

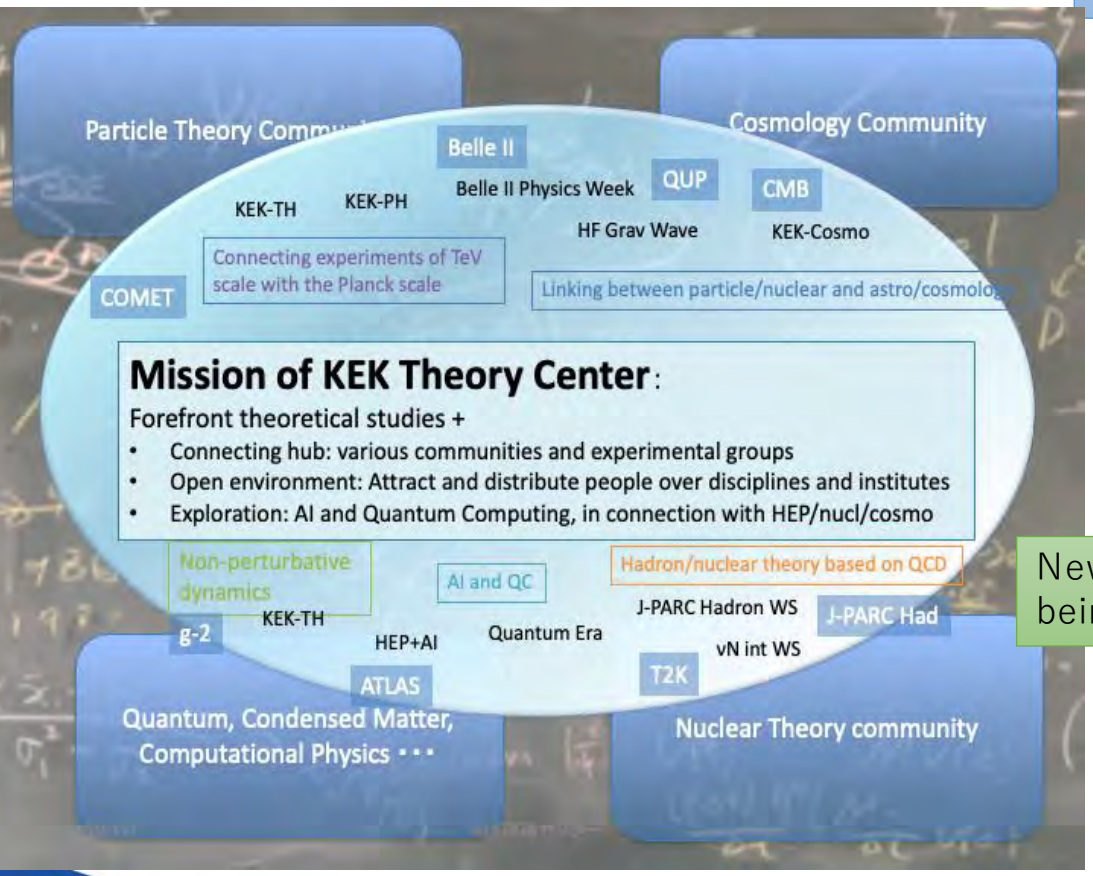
The goals of this workshop are:

1. **Review the latest results in CMB science**
2. **Define synergies between space-based and ground-based CMB measurements, data analysis, component separation and instrument development and modeling.**
3. **Following the core principles of the CMB-Inflate and Core-to-core programs, create strong international bonds between researchers and promote younger generations.**

Workshop Webpage:
https://indico.in2p3.fr/event/34780/overview

A new generation in Theory Center

- New members in Theory Center

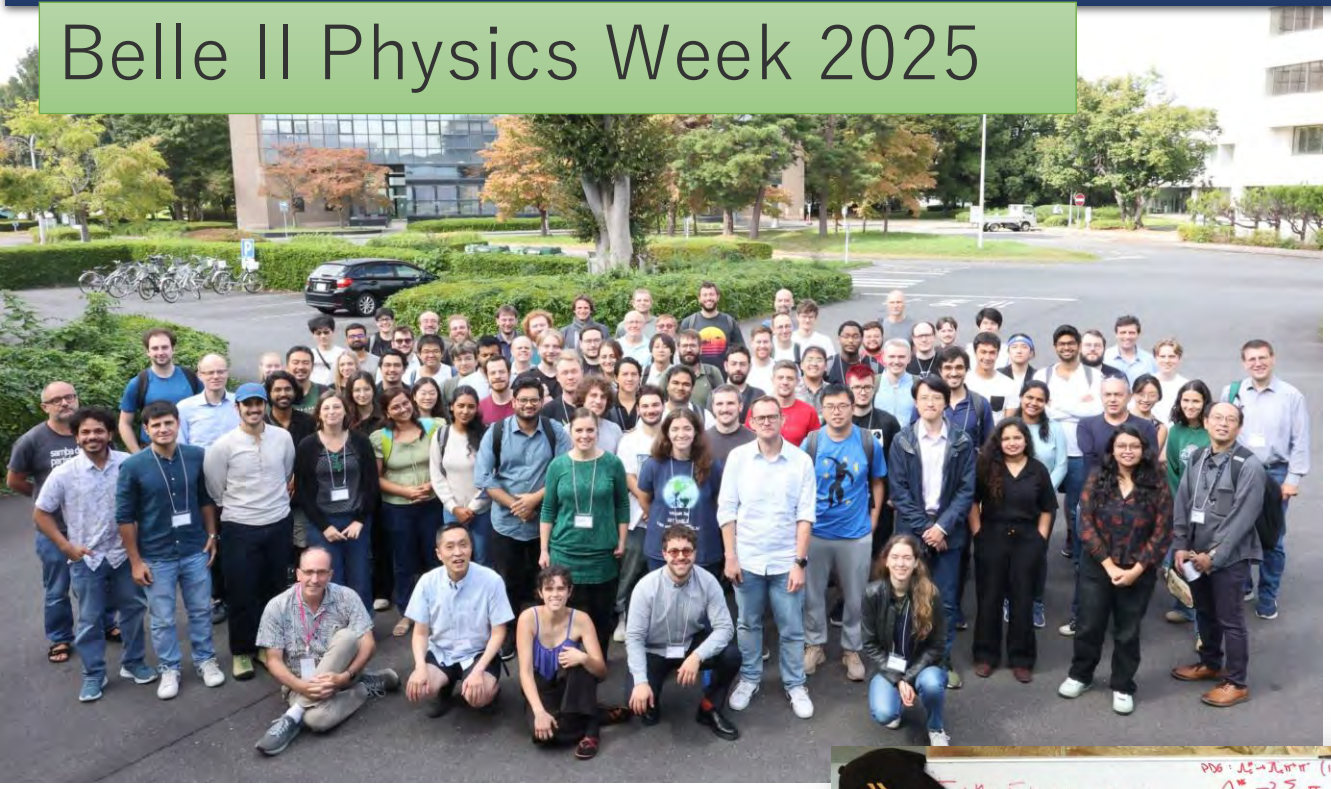


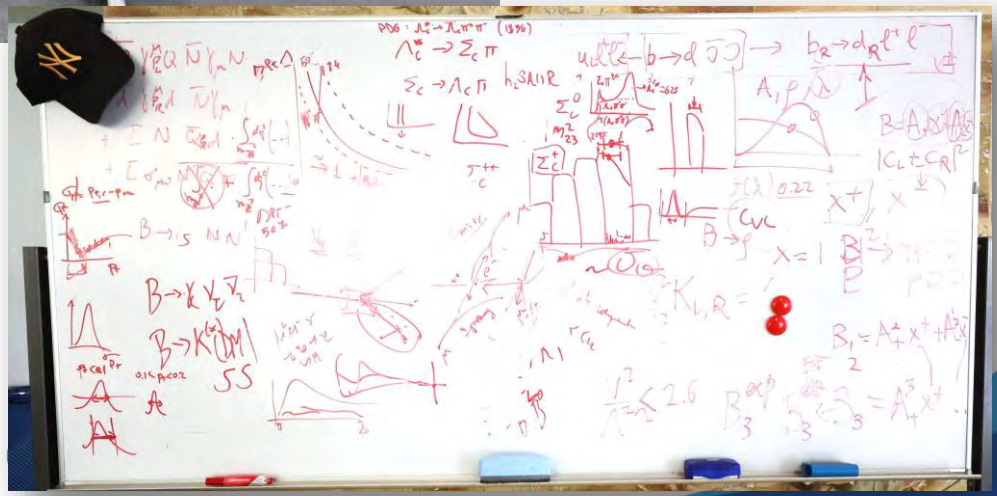
New directions are being explored

Insight through Accelerators.
KEK

Theory Center: WS and Seminars

Belle II Physics Week 2025





Dual appointment with KCL

KING'S College LONDON

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Jobs at King's College London

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Dual Appointment – Lecturer in Physics

Job id: 135925. **Salary:** £53,947 - £63,350 per annum pro rata, including London Weighting Allowance pro rata; 3.8m-4.4m JPY (+regional allowance) per annum pro rata.

Posted: 22 January 2026. **Closing date:** 19 February 2026.

Business unit: Natural, Mathematical & Engineering Sci. **Department:** Physics.

Contact details: Francesca Di Lodovico. francesca.di_lodovico@kcl.ac.uk

Location: Strand Campus and The Institute of Particle and Nuclear Studies (IPNS/KEK) (Japan). **Category:** Academic & Teaching.

Apply now

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Lecturer in Physics (Dual Appointment: 50% King's College London (UK) and 50% The Institute of Particle and Nuclear Studies (Japan)

How we recruit

At King's we seek to recruit and retain skilled and engaged colleagues to deliver the competitive advantage.

About us:

QUP for Quantum

QUP (Quantum Center) makes synergy in all KEK.

Private Companies
+ Labs

TOYOTA

NIMS

AIST
NATIONAL INSTITUTE OF ADVANCED INDUSTRIAL SCIENCE AND TECHNOLOGY (AIST)

Application Sensor Q-Connection

Quantum Material using multibeam

academic-industrial Collab. office

QUP

KEK

Mat.Lab

IMSS

PF

PP Lab

iPNS

Accl. /WorkshopLabs.

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

KEK's Core Technologies
Quantum Beams, Detector R&D, Cryogenics, Superconducting Cavities, Electronics

KEK

Q-Sensor Basic Science

Big Cryo-Labo
4 cryomodule
XLD400 in one place

International Collaboration

CERN

Fermilab

ASPIRE

UTokyo

Sensor for Basic Science
Gravity
Q-Connection
Dark Matter detection

KEKドリーム（仮称）の進め方 と素核研の委員会の関係

	第4期			第5期					
	2025	2026	2027	2028	2029	2030	2031	2032	2033
KEK		ドリーム	ショートリスト →SAC	レビュー	ドリーム	ショートリスト →SAC	レビュー	ドリーム	ショートリスト →SAC
MEXT		ロードマップ			ロードマップ			ロードマップ	

- 名前の選定　4月
- 章立て　4月
- 執筆者割り振り　4月
- コミュニティインプット？　4月から5月？
- オープンシンポジウム？？？　7月？
- 中間まとめ　8月
- コミュニティインプット？　10月
- 完成　2026年11月もしくは12月

ドリームからショートリストへ
2026.12 → 2027.11 ぐらい？

所内検討委員会

4月素核研全体WS
5月報告書提出

研究計画委員会

5月始動
7月オープンシンポ１

10月オープンシンポ2

12月にドリーム完成

引き続きSLづくりに貢献

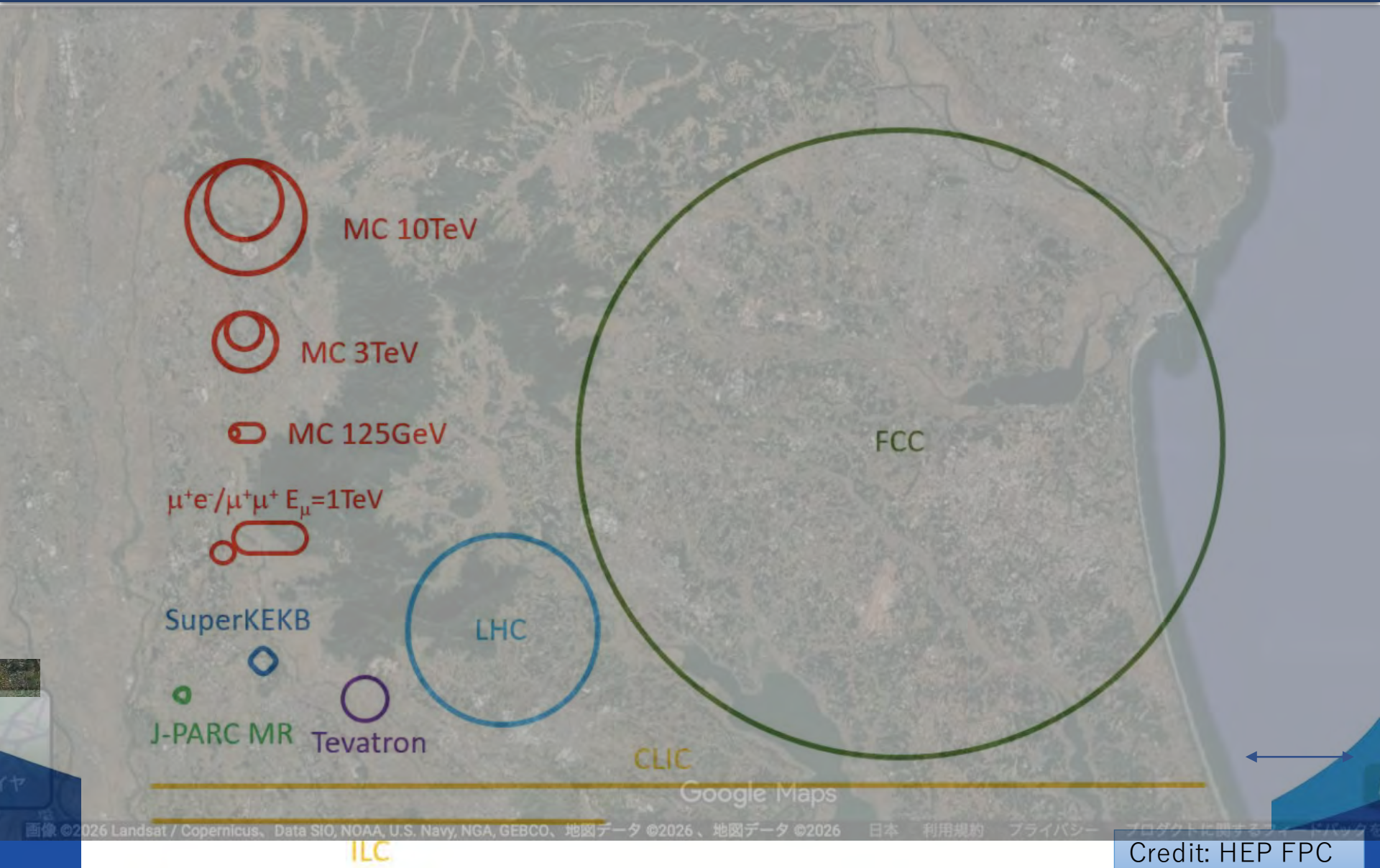
Internal Committee on
The Future Development of the Tsukuba Campus

- An internal committee has been established, comprising fourteen associate and assistant professors representing both experimental and theoretical group.
- The committee has held more than twelve plenary sessions, together with multiple focused working-group meetings, to formulate strategic options for future facility development, including but not limited to laser-, proton-, and electron-based infrastructures.
- An IPNS-wide workshop was convened in April to broaden institutional engagement and collect feedback.
- The IPNS Research Planning Committee will be reactivated in May to integrate the outcomes into the institute's formal planning framework.
- A community-wide workshop is planned for the next fiscal year to ensure broader stakeholder involvement and alignment with national and international priorities.

Let's Share More Excitements!

Backups

Future plan of Tsukuba Campus



Credit: HEP FPC

- IPNS covers a wide range of the Particle and Nuclear Physics in Japan and World.
- Despite significant efforts made by the experimental groups/collaborations, the progress has been compromised due to
  - still high electricity bill / limited resource
- Clarifying the Focus and Future Directions
  - Timeline of the projects are being updated.
  - Revision of HEF-ex ; Re-baseline of the “NEW” projects ;
- We encourage IPNS staff and community to explore new directions in addition to exploitation of current projects andf to explore more collaboration with domestic and oversea institutions.

J-PARC MR Beam Outlook

- JFY2026
  - There was no suppl. budget for electricity
  - Only < 4 cycles can be secured.
  - One cycle is available after summer.
  - Efforts are ongoing to increase the beam time;
  - cf. MLF runs for 6.8 cycles
    - MR run needs to fit in to this 6.8 cycles… under discussion?
- JFY2027
  - A plan under discussion
    - FX (T2K/HK-prep) : 4 cycles
    - SX + bunched SX (bSX): 1 cycle + α (t)
    - α (t) depends on
      - A possible supplemental budget or external funding, which changes yearly
  - COMET aims to be ready for a beam in January, 2028
- JFY2028 and after (5 years?)
  - HK starts physics data taking in June 2028.
  - Planned operation:
    - Aiming for CPV discovery at HK / Severe competition with DUNE
    - FX 5 cycles
    - SX (and bSX) 1 cycle + α (t)
- Consideration
  - The beam time is more precious than ever!
  - It may become necessary to define priority among approved experiments
  - Possible evaluation criteria:
    - Readiness for data taking
    - Readiness for data analysis
    - Publication and physics output plans

Achievements of Hadron Facility

of Users

- 27 countries, 168 institutes, 788 persons (including 411 foreigners)

[cf. Belle-II: 28 countries, 125 institutes, 1251 persons
NU: 14 countries, 78 institutes, 510 persons]

of publications (citations)

- Physics result : 46 (1732)

[cf. Belle-II: 83 (1884)]

- Review : 28 (705)
- Technical : 139 (1164)
- Proceeding : 420 (1071)

of theses

- Master : 260
- Ph.D : 65

[cf. Belle-II:
master 280, Ph.D 120]

External fundings

- JP, Kakenhi : 91 Oku-yen
- JP, other than Kakenhi : 8 Oku-yen
- Overseas : 17 Oku-yen

Citation top3

Flavor physics :

① $K^0 \to \pi^0 \nu\nu$ 2015 data (2019): 258
② $K^0 \to \pi^0 \nu\nu$ 2016-18 data (2021): 118
③ $K^0 \to \pi^0 \nu\nu$ 2013 data (2017): 55

Hadron/nuclear physics :

① Charge symmetry breaking of Λ hypernuclei (2015): 137
② Search for Kaonic nuclei via d(π^+,K^+) reaction (2015) : 83
③ Discovery of Kaonic nuclei (2019) : 82

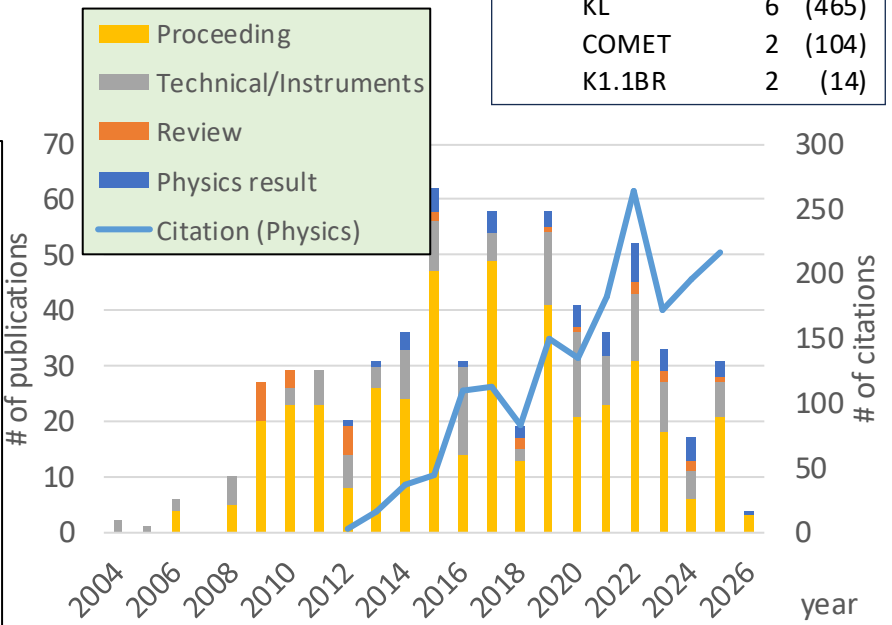
cf. Belle-II:

① Evidence of B→K ν ν (2023): 223
② ALP search (2020): 179
③ Search for B→K ν ν (2021): 105

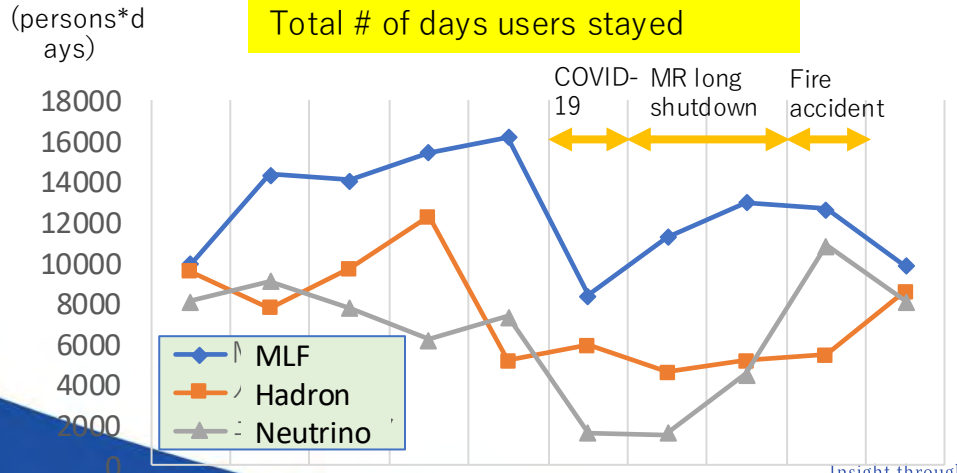
of physics papers (citations) per beam line

K1.8/K1.8BR	32	(1057)
high-p	4	(92)
KL	6	(465)
COMET	2	(104)
K1.1BR	2	(14)

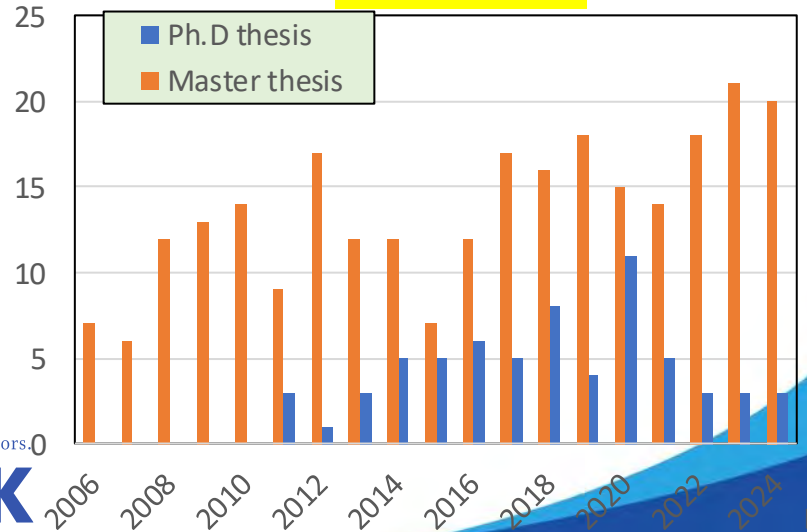
of publications/Citations



Total # of days users stayed



of theses



Highlights of Physics Results

KOTO:

Search for $K_L \to \pi^0 \nu\bar{\nu}$ decay

2015 data: sensitivity **1.3x10^{-9}**

Phys.Rev.Lett. 122, 021802 (2019), citation: 258

- upper limit 3.0x10^{-9} (world record)

2016-18 data: sensitivity **7.2x10^{-10}**

Phys.Rev.Lett. 126, 121801 (2021), citation: 118

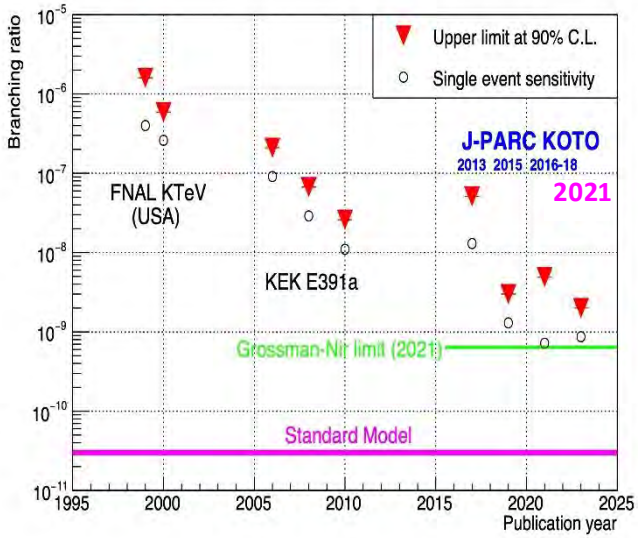
- 3 candidates, consistent with BGs

2021 data: sensitivity **9.3x10^{-10}**

Phys. Rev. Lett. 134, 081802 (2025), citation: 32

- **new upper limit 2.2x10^{-9} (world record)**

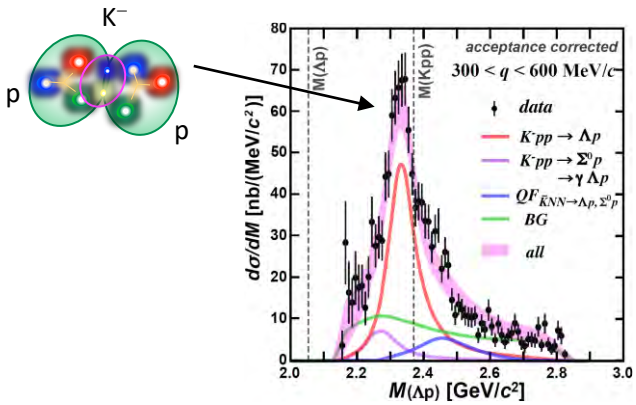
History of $K_L \to \pi^0 \nu\bar{\nu}$ search



Strangeness nuclear physics:

Study of properties and origin of "Generalized Nuclear Force" including hyperons (strange nucleons)

Discovery of novel nuclei including K$^-$ meson E15@K1.8BR

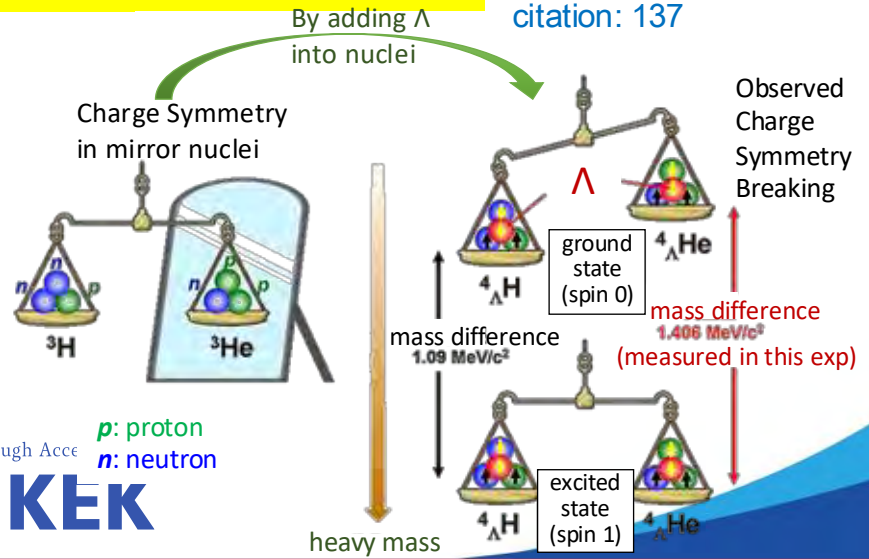


Phys. Lett. B 789, 620 (2019)
citation: 82

10 times as large binding energy as normal nuclei indicating **a compact system with high density**

Discovery of Charge Symmetry Breaking in ΛN interaction E13@K1.8

Phys. Rev. Lett. 115, 222501 (2015)
citation: 137



Highlights of Physics Results

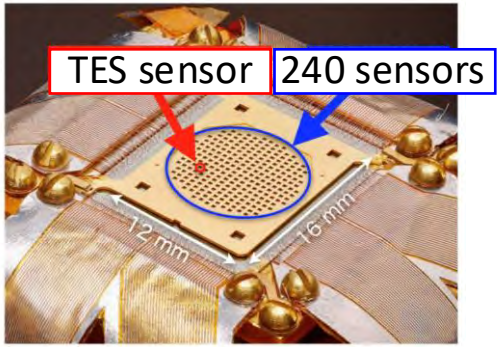
Strangeness nuclear physics:

High-precision X-ray measurements of Kaonic atoms

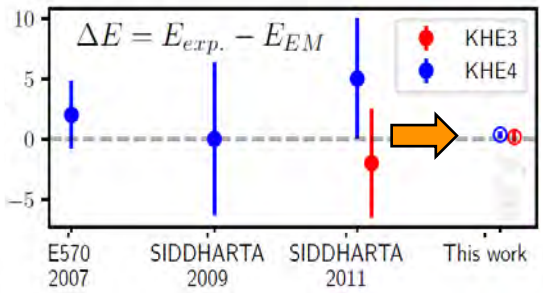
E62@K1.8BR

Phys. Rev. Lett. 128, 112503 (2022)
citation: 20

Measurements of strong-interaction effects in Kaonic ^{3}He/^{4}He atoms using **superconducting transition-edge-sensor (TES)** microcalorimeters



10 times higher precision than in previous exps

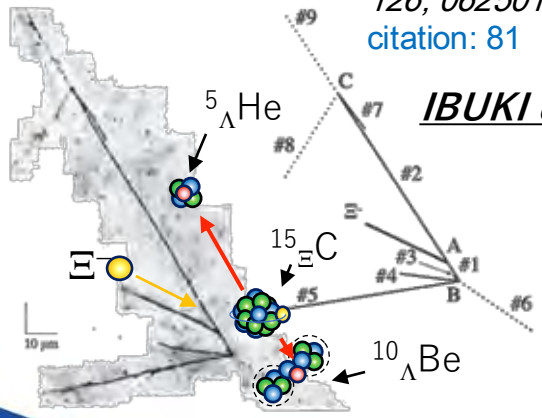


2024 Koshiba Prize
(Dr. Hashimoto, RIKEN et al.)

First mass measurement of Ξ hypernucleus

E07@K1.8

Phys. Rev. Lett. 126, 062501 (2021)
citation: 81



IBUKI event

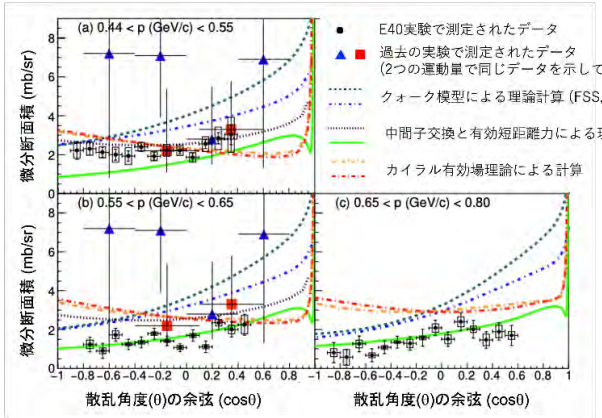
ΞN interaction was confirmed to be **attractive**

2020 Nishina Memorial Prize
(Prof. Nakazawa, Gifu univ.)

High-precision measurements of hyperon-nucleon scatterings

E40@K1.8

Large repulsive force due to Pauli effect between quarks was confirmed via Σ^+p scattering



Prog. Theor. Exp. Phys. 2022, 093D01
citation: 32

2023 Koshiba Prize
(Prof. Miwa, Tohoku univ.)

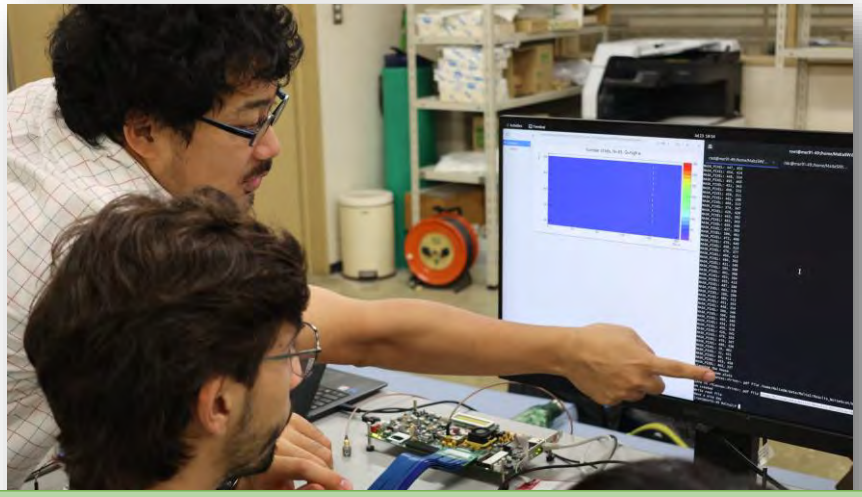
31st Outstanding Paper Award of JPS (2026)

Response to Recommendations (1)
ILC and other project

1. *In view of the uncertainties concerning the realisation of the ILC, it is important to identify synergies between the ongoing ILC R&D efforts and other projects at KEK and elsewhere.*

As a part of the efforts, we have initiated an activity for strategic advancement of MAPS for Next-Generation Colliders

- ILC / FCC-ee share a Higgs-factory detector concept
  → Common need for ultra-precise vertexing
- MAPS is a strategic core technology
  → Critical regardless of which collider is realized
- ITDC-led MAPS development
  → R&D for future lepton colliders + implementation in Belle II upgrade
- MAPS inner tracker as a dual platform
  → Technology development + On-the-Job Training (OJT)
- Community building (“MAPS Academy”)
  → Strengthening Japanese HEP toward next-generation detector leadership



MAPS Academy @Tsukuba Campus
July 23- 30, 2025