

Toshiko Yuasa Lab (TYL)



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FJPPL Meeting at Nantes, May 15, 2025

Toshiko Yuasa Lab (TYL) is an IRL

What is an IRL ?

International Research Laboratories (IRL) are laboratories from CNRS located in partner universities/institutes which bring together researchers, students, post-docs, students, engineers and technicians from both the CNRS and partner institutions in other countries.

TYL, IRL at KEK, has been created in summer 2023



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On August 1, 2023, Centre national de la recherche scientifique (CNRS) and KEK created the International Research Laboratory called “Toshiko Yuasa Laboratory (TYL)”. The agreement with CNRS to jointly establish this Toshiko Yuasa Laboratory was reached in order to further strengthen what has been conducted as a bilateral research activity between French and Japanese teams since 2006. TYL is a research center between CNRS and KEK located at KEK Tsukuba Campus to promote the collaboration regarding to accelerator R&D and accelerator-based experiments, such as the Belle II experiment .

The Director is Dr. Karim TRABELSI from IN2P3 affiliated to CNRS and Co-Director is Dr. Shoji HASHIMOTO from IPNS of KEK. This laboratory will strengthen cooperation between the two countries and promote research activities.

KEK news

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KT (as director) and Shoji Hashimoto (as co-director)
administration: Tomoko Numata/Camille Painblanc

The laboratory is structured around activities at KEK
on the following topics (and corresponding PIs)

Intensity Frontier (Yutaka
Ushiroda/Cristina Carloganu)

Energy Frontier (Kunihiro
Nagano, Roman Poeschl)

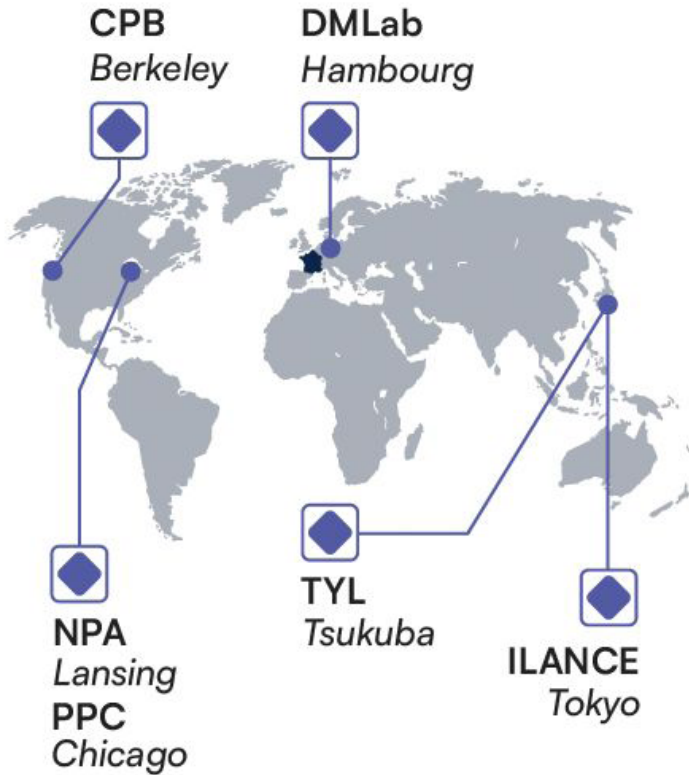
Cosmic Frontier (Tijmen de
Haan, Matthieu Tristam)

Theory Frontier (Shoji
Hashimoto, Emi Kou)

Detector R&D (Ken
Sakashita, Jerome Baudot)

Accelerator R&D (Aryshev
Alexander, Angeles Faus-
Golfe)

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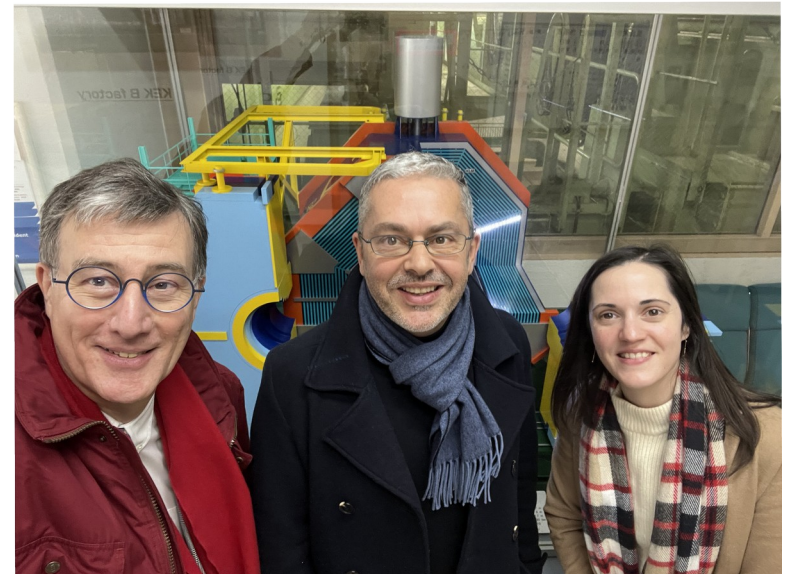


IRL KEK - TYL 
created in 2023
(K.Trabelsi, S.Hashimoto)

IRL Tokyo - ILANCE
(location: Kashiwa campus)
International Laboratory for Astrophysics,
Neutrino and Cosmology Experiments
created in 2021
(M.Gonin, T.Kaajita)

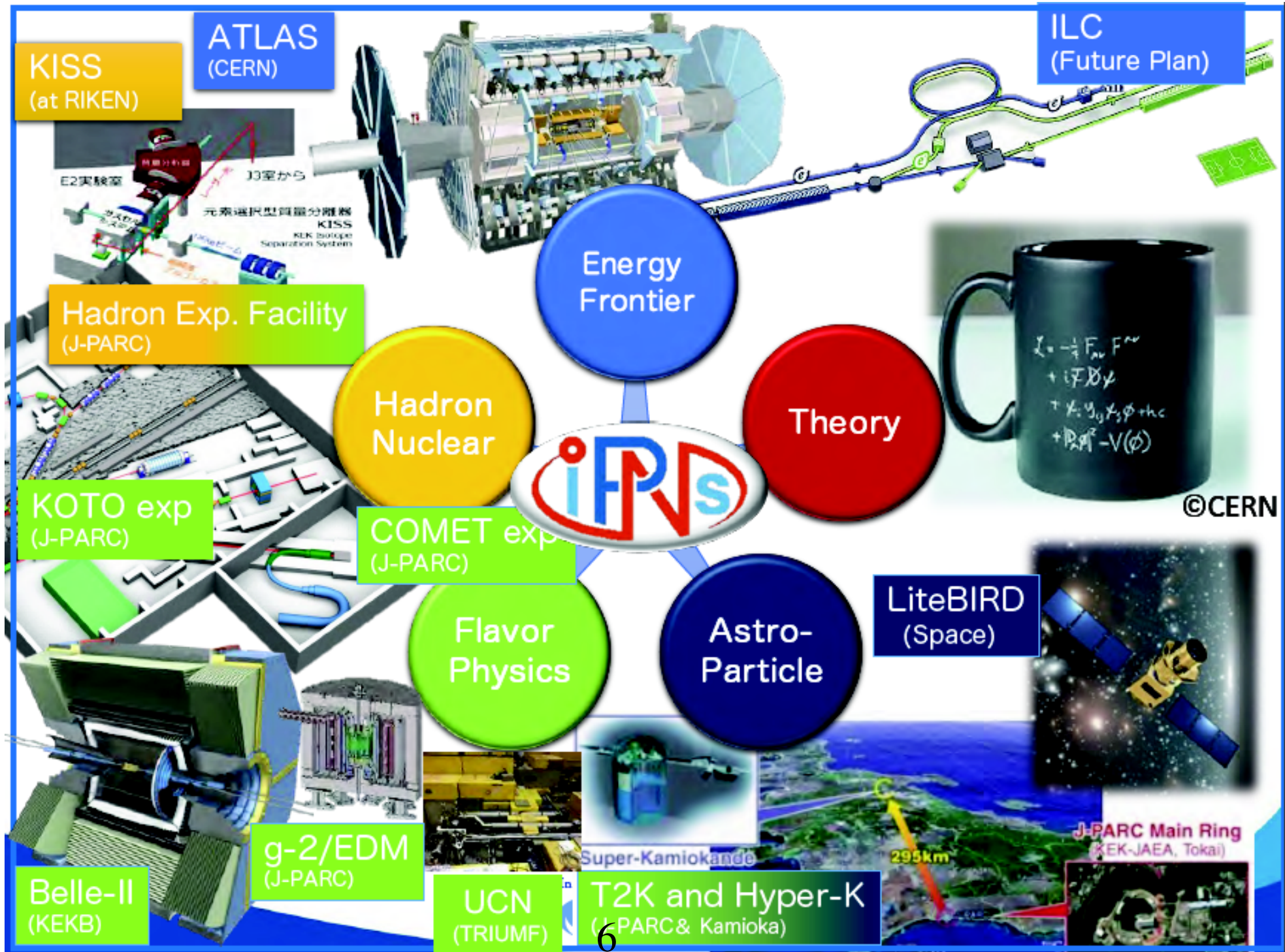
France-Japan Particle Physics Network (FJPPN)
IRN
(E.Kou, S.Hashimoto)

Visit of CNRS Tokyo office at KEK
(Feb 9 2024)



Activities at KEK (IPNS)

Saito san's talk
Wednesday morning



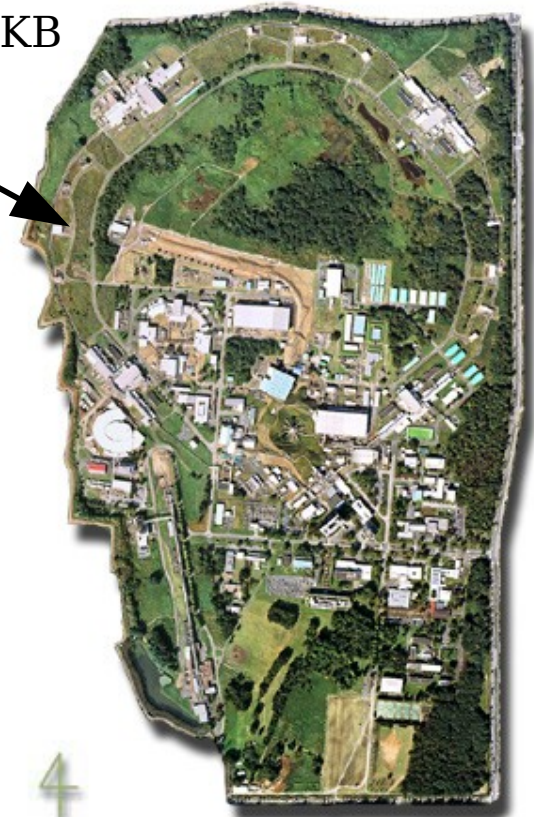
KEK

High Energy Accelerator Research Organization



Accelerator (Super)KEKB
circumference 3 km

- Tsukuba, Japan
- Largest Accelerator Facility in Japan (in Asia ?)
- Institute for High Energy Physics (Particle Physics)
- Various researches using accelerators are being done (Universe, Matter, Life)



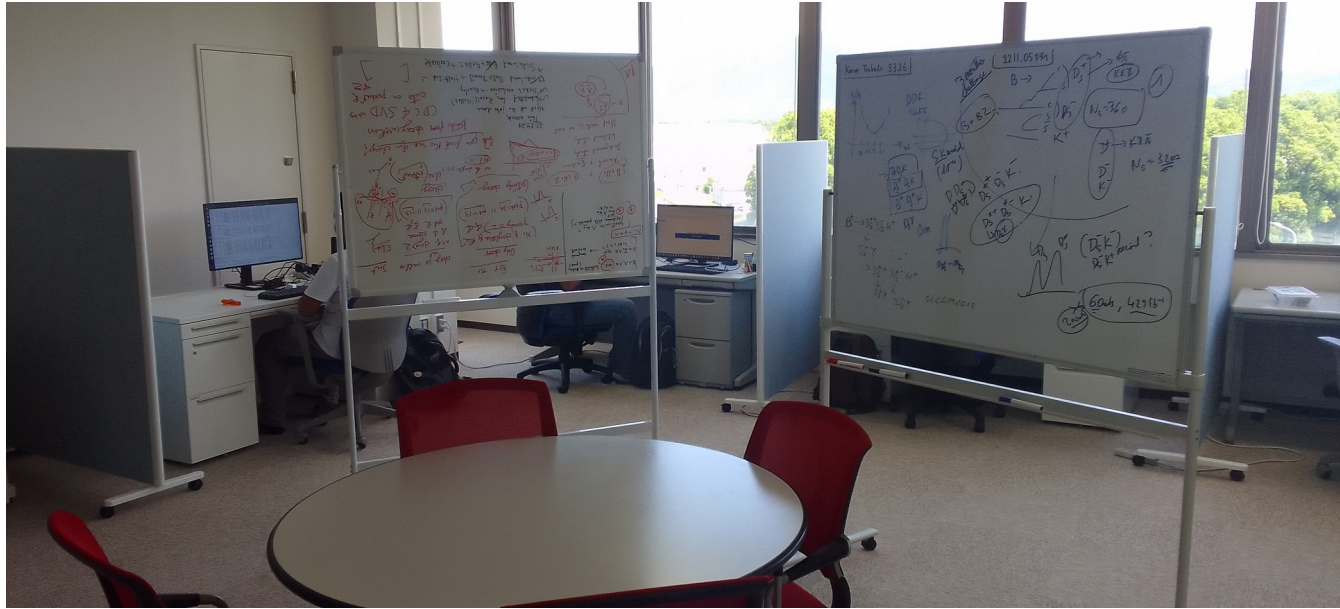
Location at KEK

- Location: 2-gokan, room 401-402
shared office with MNPL: Multi-national Partnership Laboratory

CERN/TRIUMPH office



new desks/chairs/displays/boards
pleasant/clean work environment (completely renovated in Nov 2023)
(many thanks to Takahiro Koyama/Nobutake Niita)



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Location at KEK

...with a splendid view on Tsukuba san



Participation to events at KEK

KEK Summer Student Program 2024

In the program, students belong to one of the research groups and conduct research work under the supervision of researchers in a group staying at Tokai campus or Tsukuba campus of KEK for weeks.

The duration of stay is up to 8 weeks from middle of June to middle of August.

⇒ Selected French candidate (Sophie McNeill, IPHC)
her stay (07/07/24-08/08/24) was supported by TYL

TYL Science Camp for Female High School Students (Spring)

A joint program of TYL and the KEK Gender Equality Office. ~30 students from all over Japan.
Lecturer: Yasmine Amhis (IJCLab) in 2024, Cristina Carloganu (LPC Clermont) in 2025



理系の扉
あけてみない？

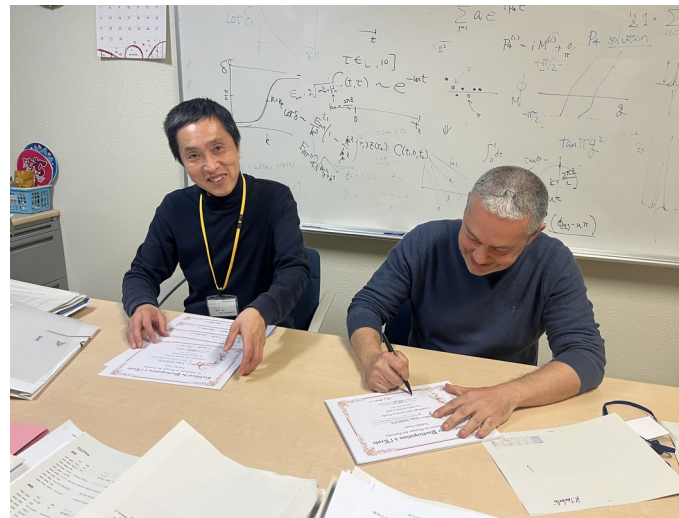
Ecole pour
jeunes étudiant
souhaitant devenir
des scientifiques.

Toshiko Yuasa Laboratory スクール
理系女子キャンプ 13th
2024年4月3日(水)・4日(木)
高エネルギー加速器研究機構 (KEK)
茨城県つくば市大塚 1-1

Programme

- 1 開校式 (開校式・開校式・開校式)
- 2 講義 (開校式・開校式・開校式)
- 3 実験 (開校式・開校式・開校式)
- 4 懇話会 (開校式・開校式・開校式)

高エネルギー加速器研究機構 高エネルギー加速器研究機構
TEL: 029-476-4264 FAX: 029-464-3560
e-mail: gyo@kek.jp
https://www2.kek.jp/tyl/camp/



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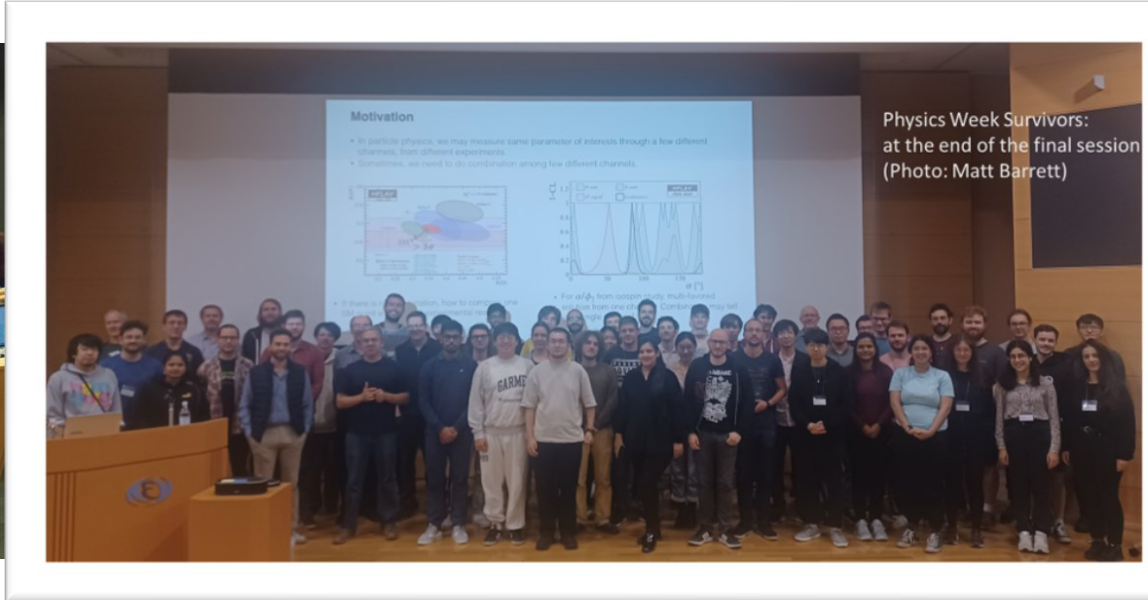
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Physics week

(School + Workshop for Belle II during Fall)



In 2023, on $|V_{cb}|$ measurement (~ 120 participants, 20 theorists)
New edition (Oct 14-18, 2024) on τ physics and Dark Sector
lecturers/speakers: Olcyr Sumensari (IJCLab), Nazilla Mahmoudi (Lyon)...

Physics week (Oct 14-18 2024)

2024 Belle II Physics Week

14–18 Oct 2024
KEK
Asia/Tokyo timezone

<https://indico.belle2.org/event/12273/>

The **2024 Belle II Physics Week** will be in
experimentalists and theory experts.

97 participants (2021, Rome)
93 participants (2022, Valencia)
123 participants (2023, KEK, + KEK theory)
151 participants (2024, KEK, + KEK theory)

All collaborators are invited to join KEK for in-person attendance.

The week will consist of two parts:

- **Mornings: a school for PhD students and early postdocs** with general pedagogical lectures about aspects of Belle II and flavour physics. It will include plenary sessions on phenomenology, detectors, and benchmark analyses along with in-person hands-on work. Plenary lectures will be recorded. In-person hands-on will be conducted on-site. Online participation will be also possible.

- **Afternoons: a workshop**, this is the second in a series of workshops on topics in
theory and experiment that are priorities for the Belle II community.

This year the workshop is on tau and dark sector at Belle II.

invited speakers include:

Marco Ardu, Anke Biekoetter, Mattia Bruno,
Lorenzo Calibbi, Pablo Roig Garcés, Stefania Gori,
Martin Hoferichter, Nazila Mahmoudi, Giordon
Stark, Olcyr Sumensari, Jure Zupan, Gilly Elor,
Tobioka Kohsaku, Robert McGehee, Tomasz
Procter, Gordan Z. Krnjaic, Adrian Casais Vidal, ...

sponsored by TYL, KMI, KEK-LBL

The Report on Belle II Physics Week 2024

Nov 1st, 2024

More than 150 physicists attended the
Belle II Physics week ...

Topics



Participation to workshops/schools at KEK

- **CMOS sensors school (July 23-30) at KEK (MAPS academy)**

<https://wiki.kek.jp/display/mapschool/MAPS+Academy>

Designing and developing such systems requires a substantial amount of fundamental knowledge and expertise. The MAPS Academy aims to provide a program that serves as a stepping stone for acquiring these skills. The MAPS Academy is a school for young researchers, such as senior graduate students (Master to PhD students), postdocs, or young faculty staffs, who wish to acquire a deeper knowledge of the development of the MAPS technologies.

MAPS Academy 2025

Date : July 23rd to July 30th,
2025

Location: [KEK Tsukuba campus](#),
Ibaraki, Japan

Director: J. Baudot, Y. Enari

- **Belle II Physics Week (Oct 6-10, 2025)**

Rare decays of beauty and charm hadrons with missing energy

Current list of stays supported by TYL

[2024]

- **Meng Li (IJCLab) - PhD student at Belle II**

(stays 2×2 months: May - June 2024, Nov - Dec 2024)

on injection-related beam loss and background measurement and simulation, as well as on luminosity monitoring and studies (LumiBelle2, ZDLM)

- **Matteo Maushart (IPHC) - M2 internship project on Belle II Trigger**
(stay 2 months: July - August 2024)

work on the Belle II trigger system partly with the current detector and partly in anticipation of an upgrade

- **Sophie McNeil (IPHC) - M1 internship project on Belle II beam bckg**
(stay 1 month: July 2024)

participation to the KEK summer school

- **Mattia Marfoli (International thesis coordinated by MITI, CPPM/TYL)**
- PhD student on Belle II (stay 3 weeks: October 2024)

work on missing energy modes and B-tagging at Belle II

- **Anna Korsun (IJCLab) - PhD student on FCC-ee**
(stay 2 months: Nov - December 2024)

ATF2 operation, monochromatic IR optics in SuperKEKB

⇒ short visits: French students from COMET, Cristina Carloganu (Clermont), Rachid Guernane (IPHC), Nazila Mahmoudi (Lyon)

⇒ seminars organized at KEK: Yasmine Amhis (IJCLab), Nazila Mahmoudi (Lyon), Adrian Casais Vidal (Boston), Tejhas Kapoor (IJCLab)

Current list of stays supported by TYL

[2025]

- **Tejhas Kapoor (IJCLab) - PhD student in theory**

(stay 1 month : Jan 2025)

involved in semi-leptonic B decays, interacted with KEK theory department (+seminar) and Belle II (meeting/discussion with the semi-leptonic WG)

- **Yuting Wang (IJCLab) - Post-doc at FCC-ee**

(stay 1.5 month : Feb-March 2025)

- **Iryna Chaikovska (IJCLab)**

(stay 3 weeks : Feb-March 2025)

on high-intensity positron sources for the Future Circular Collider (FCC-ee) extension of the current efforts on simulation tools and benchmarking of simulation models, using the SuperKEKB positron source.

- **Other shorter stays this year around February**

Mattia Marfoli (CPPM, TYL), Meng Li (IJCLab)...

- **Mattia Marfoli (CPPM, TYL)**

(stay 2.5 months: April-June 2025)

- **Karina Zimmerman - internship of high school student**

(stay 2 weeks: June 2025)

- **Anna Miller (LPSC) - internship of Master Physics of Grenoble (UGA)**

(stay 2 months: July-August 2025)

CMOS characterisation , beamtest at KEK

- **Thomas Lauber (IPHC) - M1 internship project on VTX for Belle II**

(stay 1.5 months: July-August 2025)

Participation in Belle II

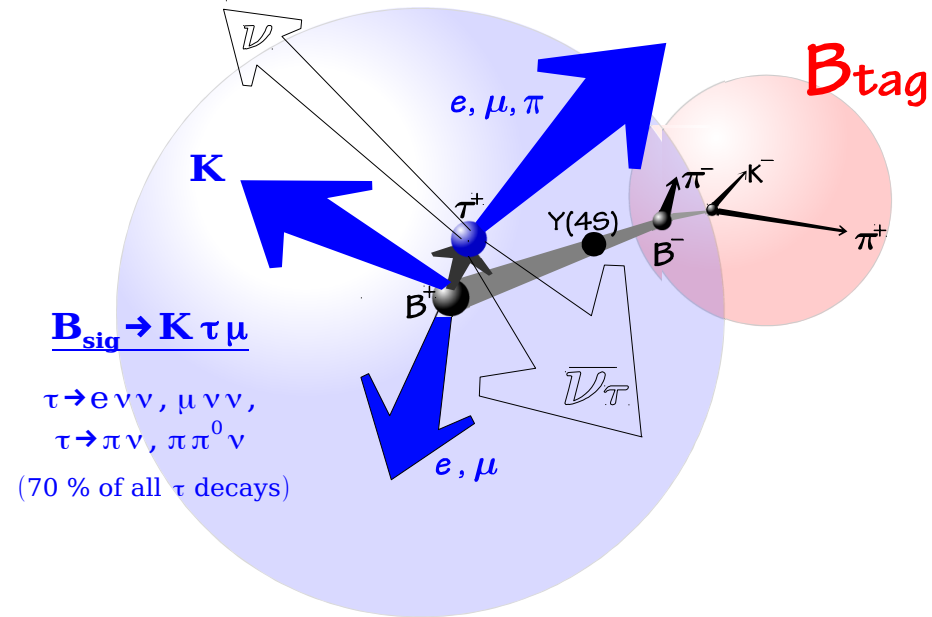
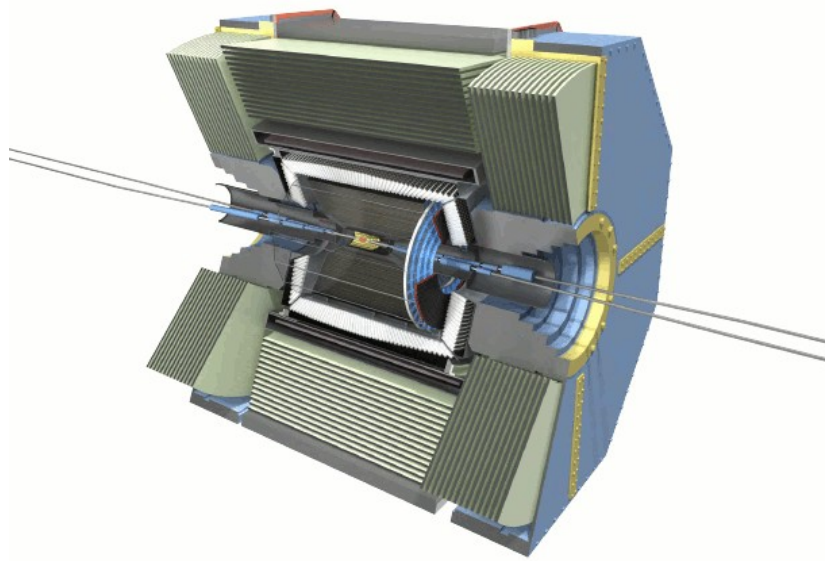
(approved at Belle II collaboration meeting Feb 2024)

- TYL new group on Belle II since 2024
- currently I'm the only staff member with involvement in Belle II, allows me to stay at KEK during Belle II spokesperson's mandate
- **IN2P3 post-doc, started from Dec 2024 for 2 years**
<https://inspirehep.net/jobs/2775795> → Rahul Tiwary
- host any IN2P3 colleague for long stays
- M&O handled at a national level rather than institutionally, so addition of TYL does not significantly change situation
- service/authorship contributions:
HLT operations, B-tagging development, search for rare B decays with missing energy...)

Many visitors around our Belle II activities

Many interesting B-physics studies involve missing energy

$B \rightarrow D^{(*)} \tau \nu, K^{(*)} \tau l, K^{(*)} \tau \tau, K^{(*)} \nu \nu, \pi l \nu, \tau l, \tau \tau, \tau \nu, \mu \nu \dots$



- Vismaya VIMAL SUKHIDA (IIT Hyderabad), hadronic B decays (Oct-Dec 2023)
- Cheolhun Kim (Hanyang/Korea), $B \rightarrow \tau \tau$ (visit Jan-Feb 2024)
- Trevor Shillington (McGill/Canada), $B \rightarrow K \tau l$ (visit Feb-March 2024)
- Swarna Mahrana (IIT Hyderabad/India), $B \rightarrow$ charmed baryons (April-June 2024)
- Varsha Gautam (IIT Bhubaneswar/India), $B \rightarrow D_s D_s K$ (May-June 2024)
- Sourabh Chutia (IISER Mohali), HLT (May-June 2024)
- Meihong Liu (Fudan University/China), $B \rightarrow K_s \tau l$ (June 2024)
- Cheolhun Kim (Hanyang University) $B \rightarrow \tau \tau$ (Oct-Nov 2024)
- Vismaya VIMAL SUKHIDA (IIT Hyderabad), hadronic B decays (Sep-Oct 2024)
- Altug ELPE (METU), HLT (Dec 2024-Feb 2025)
- Swarna Mahrana (IIT Hyderabad/India), $B \rightarrow$ charmed baryons (Feb-April 2025)

In short,



if you want to organize (for you or your collaborators) a long stay at KEK for your research activities, please contact us or/and our PIs

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Instrumentation Technology Development Center



Instrumentation Technology Development Center

International Hub for instrumentation development

Promotion of Innovation and Young researches

Inter-University Research

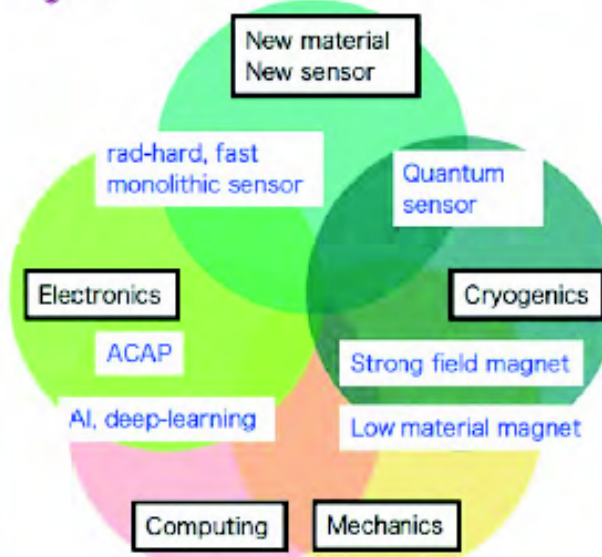
- Extension of inter-university research functions
- More efficient and faster development
→ International visibility



- 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)
- Some platforms to do R&D
 - works as the interface to the community
- Technology candidates
 - Strong field magnets
 - New material semiconductor (eg. CIGS) for rad-hard
 - BiCMOS technology for high speed
 - Next generation FPGA based readout
 - ...



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