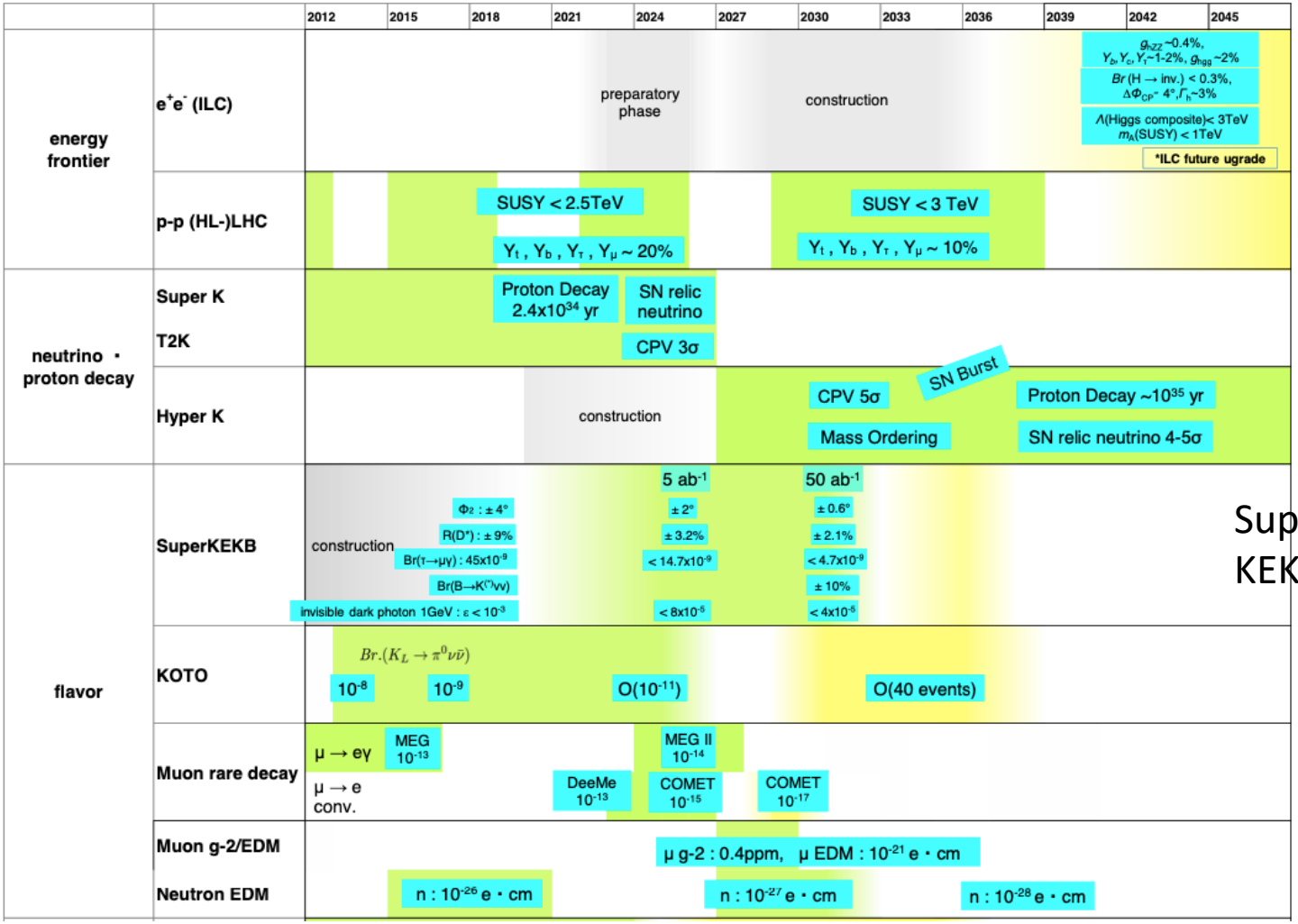
Activities for ILC
in Japanese HEP community

11th Oct. 2023

Shoji ASAI (ILC Japan spokesperson, U-Tokyo)

The Plan of Japanese HEP program

arXiv:2203.13979
input for Snowmass



The Plan of Japanese HEP program

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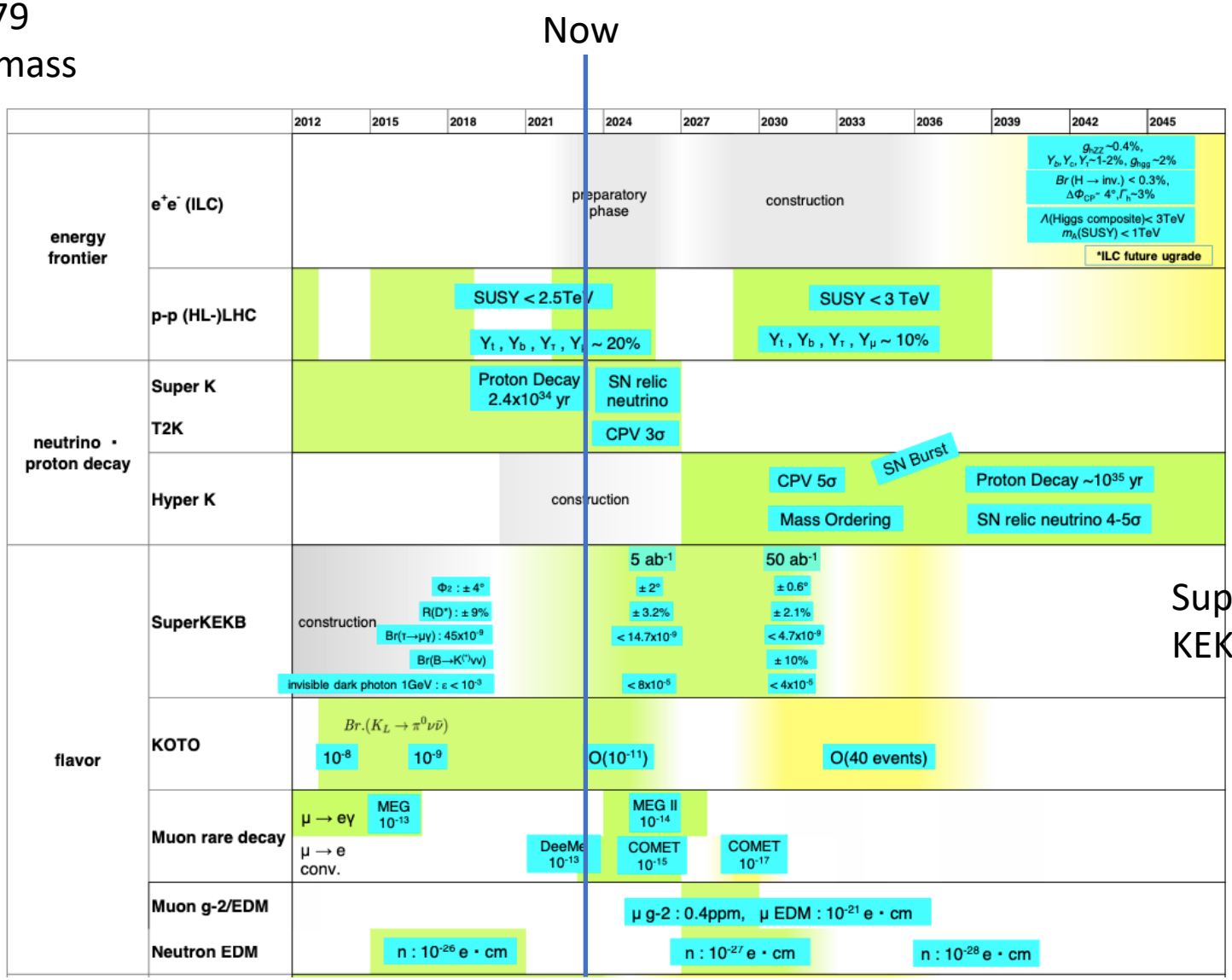
ILC is the top priority of Future project after SuperKEKB and HK.

We hope Physics Run of ILC starts around 2040, Overlap with HL-LHC. Continue Higgs Program



ILC-Japan was set up by JAHEP

（Japan Association of High Energy Physicists）

May 2021

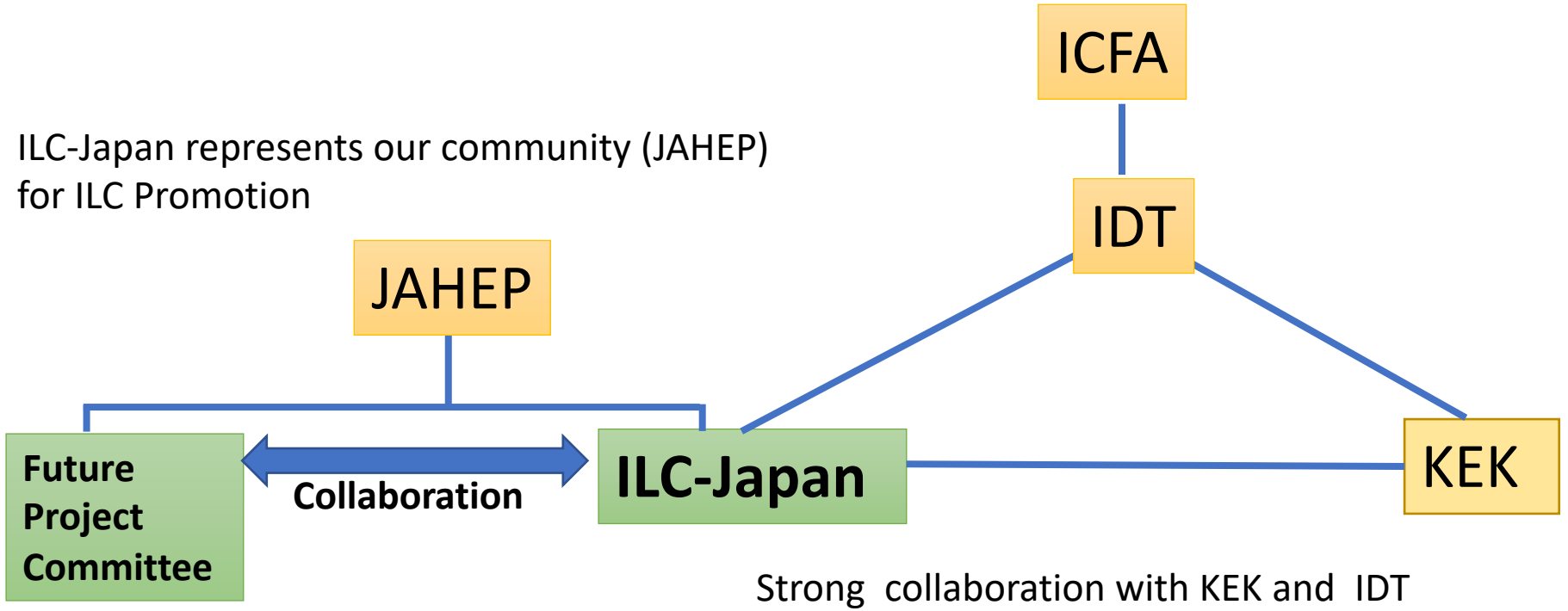
1) ILC-Japan represents our community (JAHEP) for ILC Promotion.

2) Tight collaboration with KEK and IDT

3) ILC-J Collaborates with Future Project Committee (Younger generation) to realize ILC and encourage younger generation to join ILC

4) Domestic / International collaboration

Relation



ILC-Japan represents our community (JAHEP) for ILC Promotion

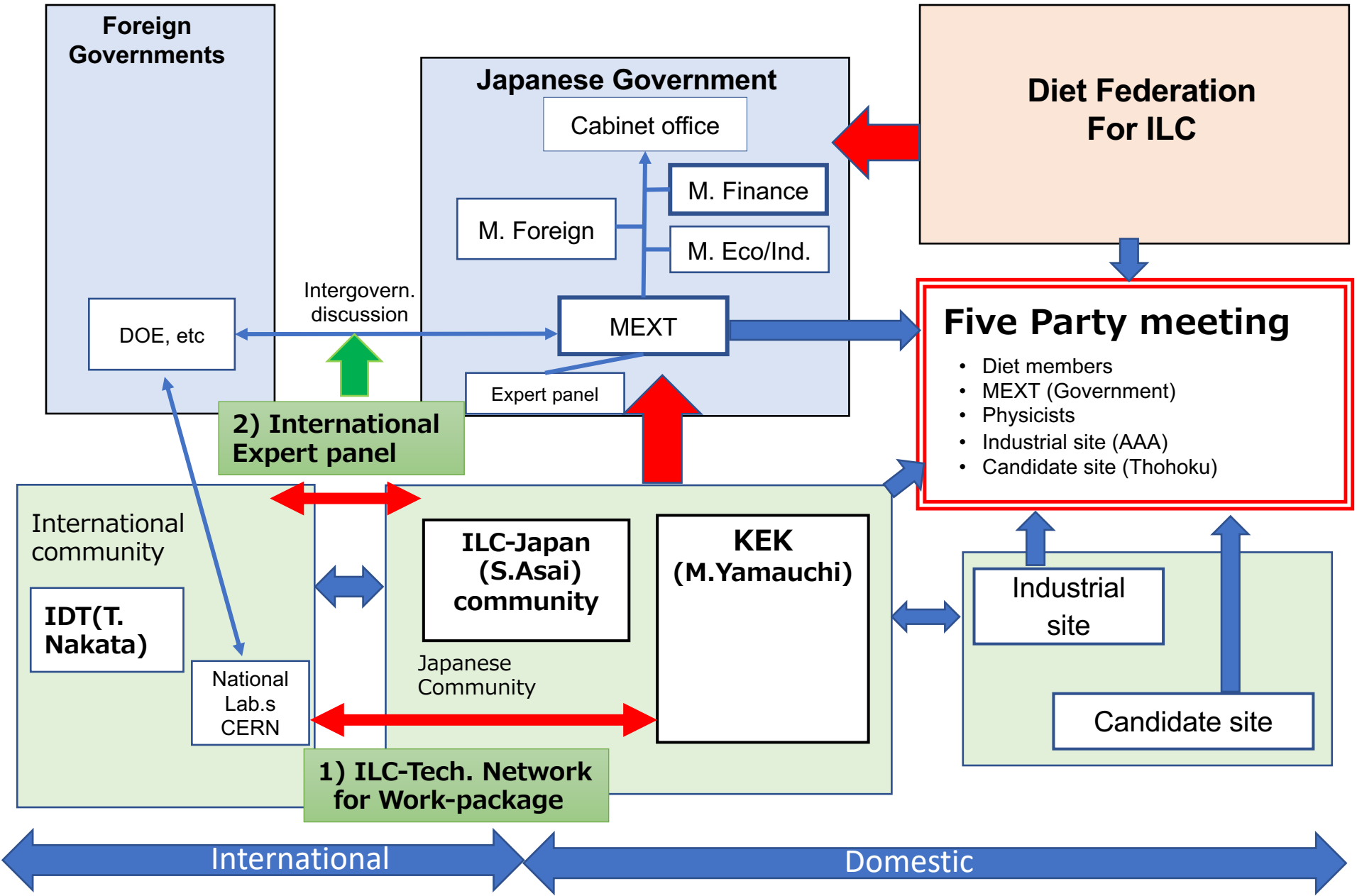
Strong collaboration with KEK and IDT

Collaboration

ILC-J Collaborates with Future Project Committee (Younger generation) to realize ILC and encourage younger generation to join ILCTN and Detector

ATLAS-Japan / theorists starts to perform ILC-Phys and Detector R&D

Promotion scheme of ILC



The Results of five party meeting

FP meeting plays important role in the promotion

1) Budget for ILC R&D increases by factor 2 -> ILCTN

2) Integrated Innovation Strategy 2023 (Government Policy)

Determined in the last June

Chap.2 Science, technology and innovation policy

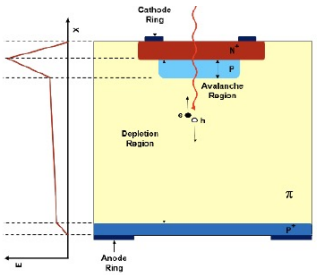
Promote the development and utilization of large-scale projects and cutting-edge projects

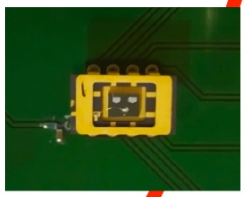
Steadily develop technologies related to future high-performance accelerators

Start R&D future detector as global efforts

1) KEK Energy Frontier Group (LHC/ATLAS) starts R&D Solid State Detector

2) U-Tokyo ICEPP Group
continues to develop
calorimeter with high granularity
and fine time resolution.
AI and Q detectors.

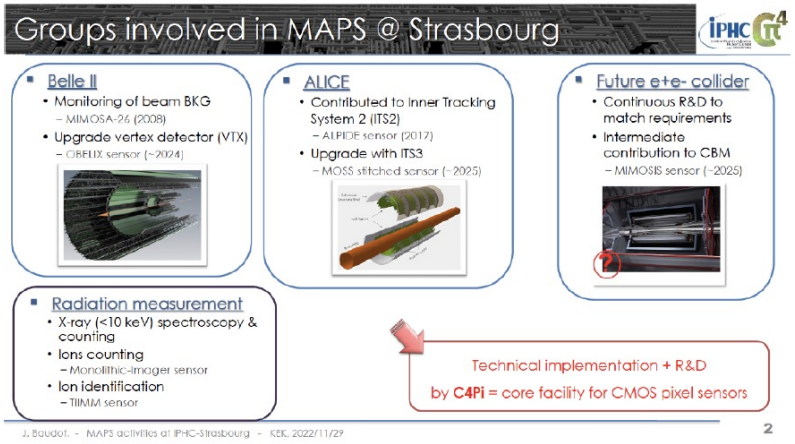


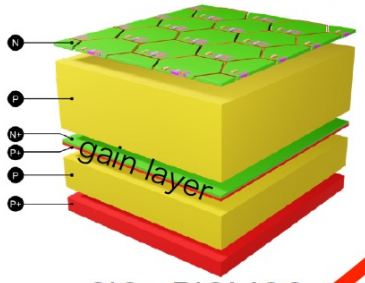


New material

Road Map of R&D

Low Gain Avalanche Diode(LGAD)





SiGe BiCMOS

Picosecond

~10 ps timing resolution

radhard?

➔ Hadron Machine
or Muon Collider

Monolithic
CMOS

few μm spatial resolution

High Space resolution

High Time
resolution

➔ Higgs Factory

Proposal task list

Solid state detector :

- Monolithic CMOS sensor with European groups
- Exploiting the properties of SiGe BiCMOS
- Explore LGAD capability
- Radiation hardness of semiconductor detectors
- R&D of the new material sensor

These R&D will/have start

Electronics :

- R&D for ultra high-speed date transfer (optical)
- AI on FPGA

Detector and computing will be completely changed by AI (in Era of 2030)

Machine Learning :

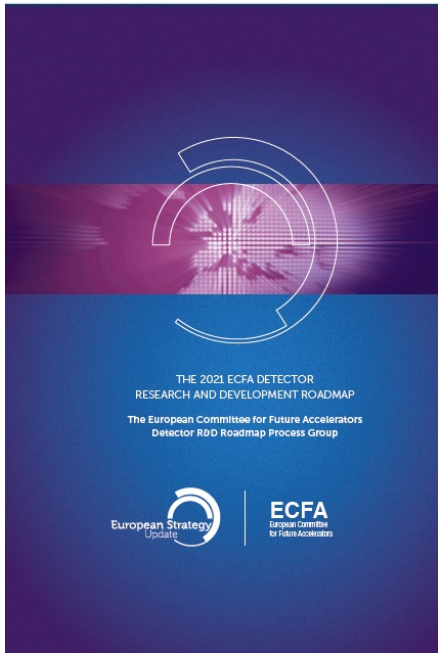
- Application of AI/ML to detector operation
- Application of AI/ML to detector production and QC/QA
- Application of AI/ML to Object ID, track/vertex reconstruction

Magnet :

- Feasibility study of the detector magnet
- Possibility of HTS

Calorimeter

Quantum Technology



Within the international R&D framework:

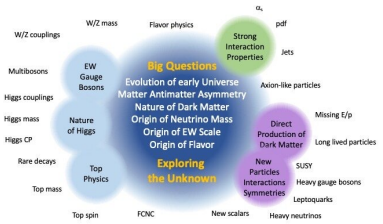
International is crucial for the future detector.

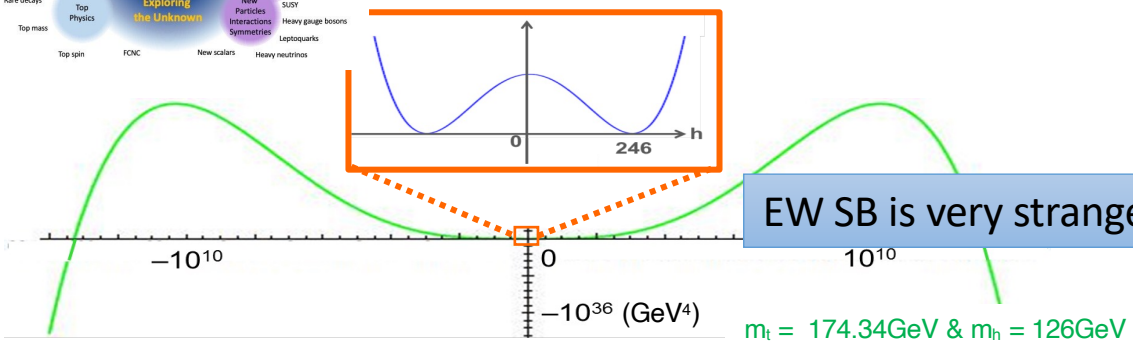
① Break through encourage younger generation to join.

② Boost up Global discussion

Higgs is related to many fundamental Questions.

Big pictures are necessary to obtain wide support from Physics.



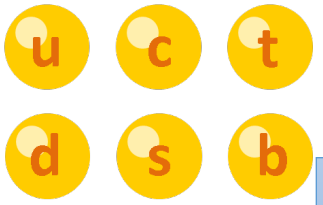


EW SB is very strange

m_t = 174.34GeV & m_h = 126GeV

Shape of Higgs Potential / Origin of EW SB

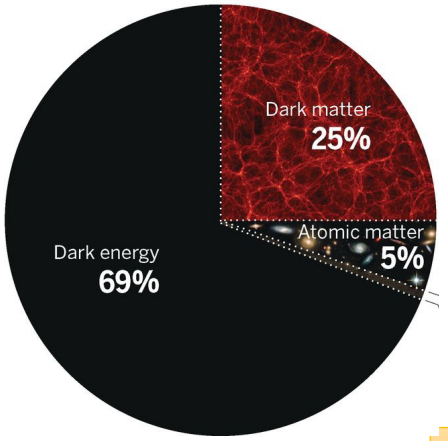
quark

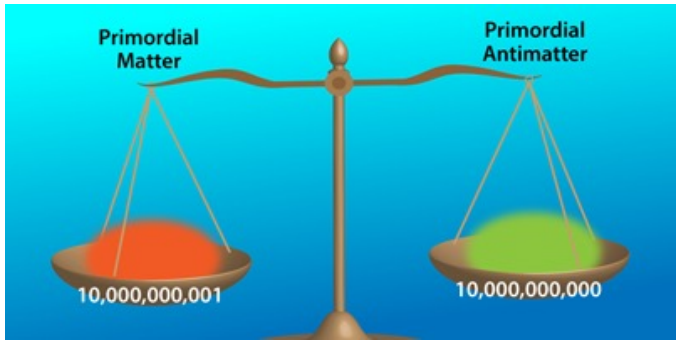


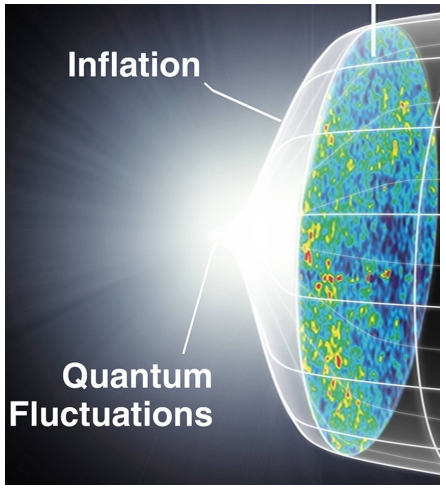
lepton

Higgs makes Flavor

Origin of Flavor







Matter/Anti-matter asymmetry

Dark matter
Dark Energy

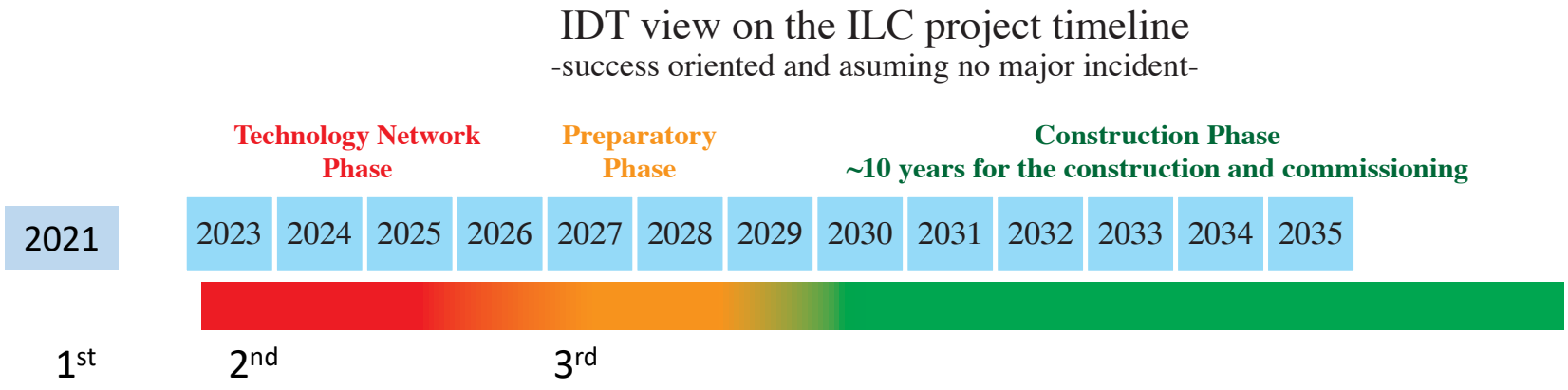
Higgs Portal

International effort for Big picture is vital to move the next step.

Origin of Inflation?

Timeline / Step-by-Step ILC promotion

This Timeline is considered by us,
Discussed in IDT/ICFA/Diet Federation.
not Government approved.



1st stage Prepare ILCTN
International expert panel makes global script.

- Budget is ready
- Various National Labs join ILCTN

2nd Stage ILC TN develops TC-WP

We cultivate environment for international discussion
(both @ scientist community and government level)

Japan takes role / initiative in ILCTN (we are asking to JG)

- FCC-ee FS final report
- recognize ILC as the most realistic, cost-friendly, carbon-friendly project
- Understand of Governments/Communities ILC is global project
- International situation (Pandemic, global economy, tension)

3rd Stage Governments discuss cost sharing/responsibility of ILC (as Global project)

- Fix final cost including civil engineer.
- Cost sharing / responsibilities are agreed @ Governments

Start construction.

Let's Join!!!

2nd Stage **ILC TN develops TC-WP**

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Now!! (both @ scientist community and government level)

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Thank you for your attention !!