Detector R&D in FJPPL/FKPPL

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- **FJPP/FKPPL projects on instrumentation**
- **Timeline of future HEP or Projects**
- **Detector technologies**
- **Which strategy for the detector R&D in FJPPL/FKPPL (Questions) ?**

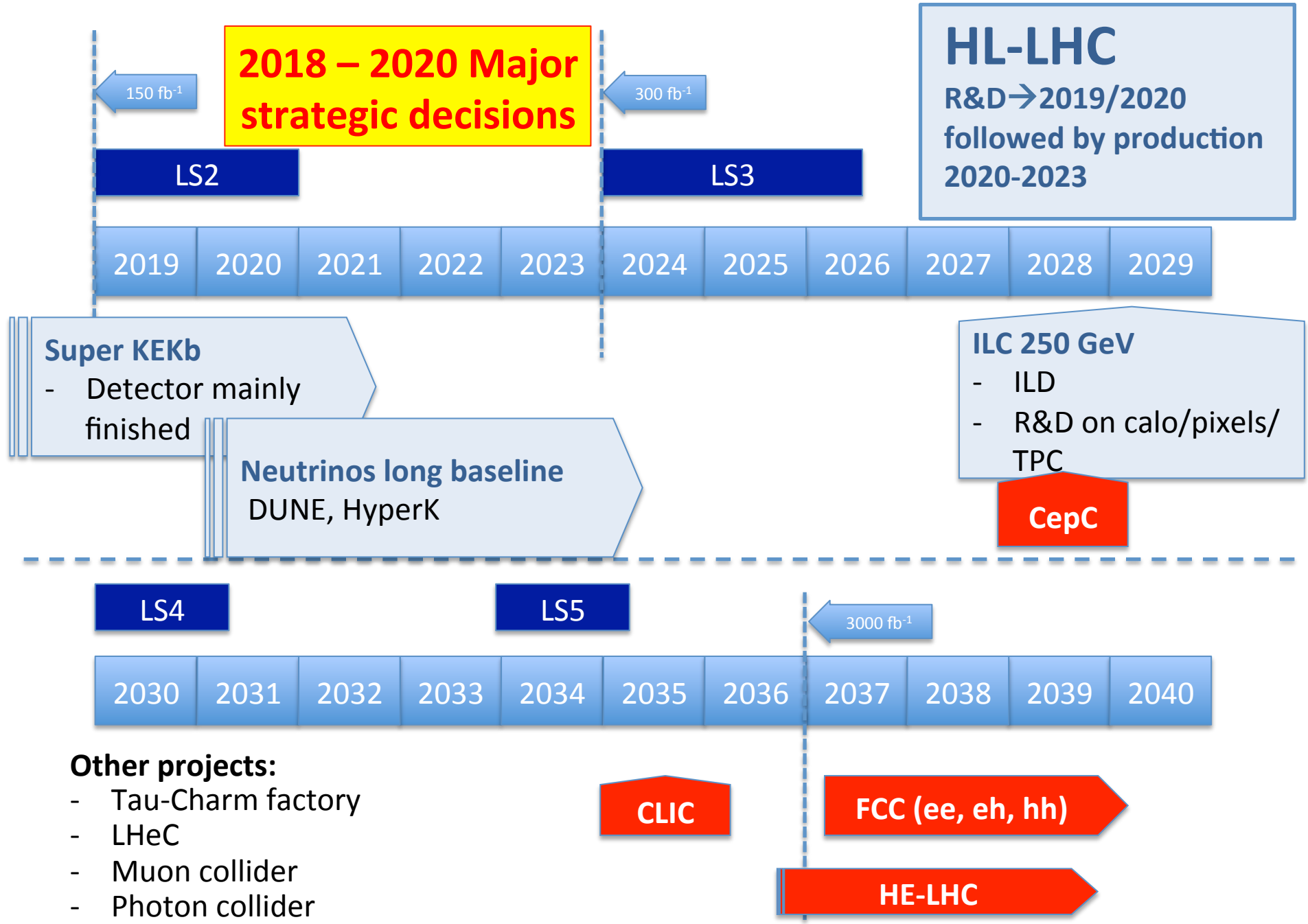
&

DISCUSSION

Common projects with instrumentation

- **FJPPL** **FKPPL**

ILC/CALICE SiW (beam test) COMET (Electronics & trigger)? ALICE MFT and dimuon	ILC/CALICE SIW (beam tests) COMET (electronics & Trigger)? ALICE MFT & ITS
W105 DP LAr TPC TPC for ILD	GRPC CMS R&D
	GBAR (TOF, trap → commissioning)) LAMPS (Front End electronics)
Planar pixel sensors Monolithic sensors MAPS	SITRINE0 (Si tracker for education)


2018 – 2020 Major strategic decisions
150 fb-1
300 fb-1
LS2
LS3
HL-LHC
R&D→2019/2020
followed by production
2020-2023
2019
2020
2021
2022
2023
2024
2025
2026
2027
2028
2029
Super KEKb
- Detector mainly finished
Neutrinos long baseline
DUNE, HyperK
ILC 250 GeV
- ILD
- R&D on calo/pixels/ TPC
CepC
LS4
LS5
3000 fb-1
2030
2031
2032
2033
2034
2035
2036
2037
2038
2039
2040
Other projects:
- Tau-Charm factory
- LHeC
- Muon collider
- Photon collider
- …
CLIC
FCC (ee, eh, hh)
HE-LHC

Silicon Sensors

Silicon is used for trackers

- New tracker in ATLAS/CMS, only Silicon :
  - 3d sensors for pixels
  - Planar (edgeless) sensors for pixels (Fr/J)
  - HV-CMOS (ATLAS option for outer layer of pixel) (Fr)
  - Silicon strips (J)
- ALICE (MFT/ITS) now in production for phase 1 (K/Fr)
- MAPS/CMOS for ILD pixel detectors (Fr/J)

• **But also large area of silicon sensors in :**
  - HGCAL of CMS (Fr)
  - Timing detector with LGAD sensors (HGTD ATLAS and CMS)

→ Improving radiation hardness, pixel size /dead areas, interconnection, timing performance …… and cost !

Detectors for HL-LHC

- **New muons chambers :**
  - ATLAS New Small Wheels (IRFU/Fr), mainly large areas MicroMegas (Phase 1)
  - New high eta chamber in CMS (K/Fr) with RPC, with good time m measurement capabilities

R&D for HL-LHC should finish around 2019 to start production.

(Should FJPPL/FKPPL focus of HL-LHC next two years ?)

Detectors for ILC and future HEP projects

Towards ILC :

- CALICE development (Fr/J) : large scale EM calorimeter prototype with beam test in 2017/2018
- CMOS pixel detectors (Fr/J) :
- TPC developments (Fr/J) :

Neutrinos :

- MicroMegas (Fr)
- SiPM for trigger light measurement (Fr)

- **~2018-2019 : Major strategic decisions (ILC,CEPC)**

Which strategy for detector R&D (1)

- Continue with one year request mainly based on networking/travels than real common R&D work

OR

- Change towards 2-3 years financed budget with deliverable R&D object (not only networking but R&D collaboration but less projects financed)

Which strategy for detector R&D (2)

- Give stronger weight to common Japan/Korea/France projects to have enough internal critical mass to make R&D

OR

- Continue collaboration between us in larger R&D collaborations ?

Which strategy for detector R&D (3)

- Investigate long term detector R&D technology (not targeted yet to any project)

OR

- Continue current R&D on less risky technology towards present projects

Which strategy for detector R&D (4)

- Propose identified hot topics on which to work (top bottom coordinated approach)

OR

- Continue with bottom-up approach and many different technologies

Conclusion (1)

- The detector activity in FJPPL/FKPPL is not really R&D but more networking on detector development.
  For the people involved, persons exchange (students) for short period or face to face meetings is thought to be something crucial to keep

Conclusion (2)

- Real France/Japan/Korea R&D collaboration will be desirable with 2-3 years financed project and clear target/milestone

  - With the present budget of FJPPL/FKPPL these projects can not be supported but :
    - FJPPL/FKPPL could help in identifying 1 or 2 promising R&D where the teams have expertise
    - FJPPL/FKPPL could help monitoring the progress

  → but decision should be taken at high level of Funding Agency/ Lab if such a direction would be desirable
  (Such R&D can be done with European partner thanks to the EU budget such as in AIDA-2020

  → Can such an initiative be part of NR call between two countries ?

Conclusion (3)

- Within the brainstorming, it appears that FJPPL/FKPPL would be the ideal place for “ High-technology innovative” R&D not yet targeting to a project.