

# 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**

**HL-LHC**  
R&D → 2019/2020  
followed by production  
2020-2023

150 fb<sup>-1</sup>

300 fb<sup>-1</sup>

LS2

LS3



**Super KEKb**  
- Detector mainly finished

**Neutrinos long baseline**  
DUNE, HyperK

**ILC 250 GeV**  
- ILC  
- R&D on calo/pixels/TPC

**CepC**

LS4

LS5

3000 fb<sup>-1</sup>



**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 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.