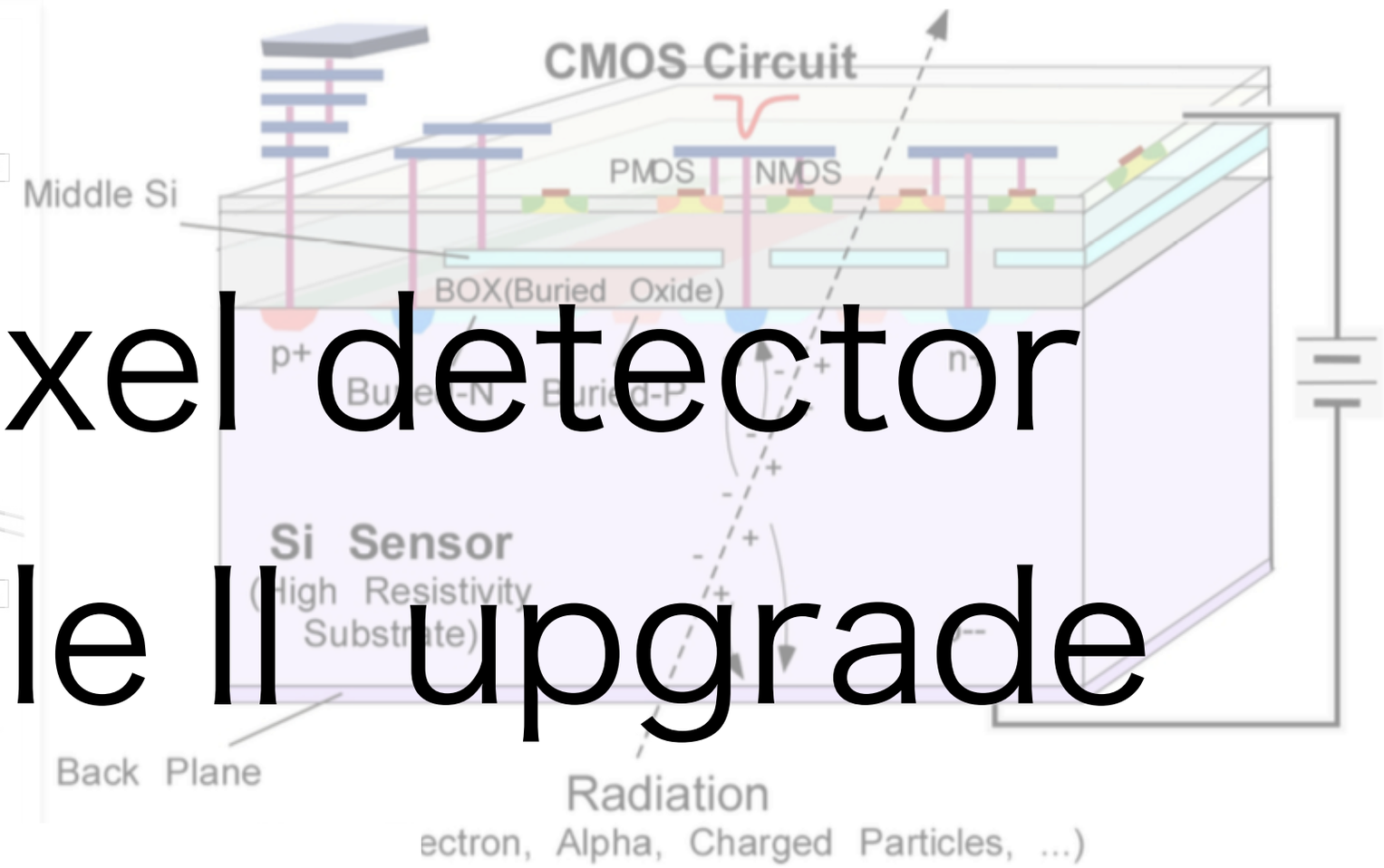
GPPU progress report



SOI pixel detector for Belle II upgrade

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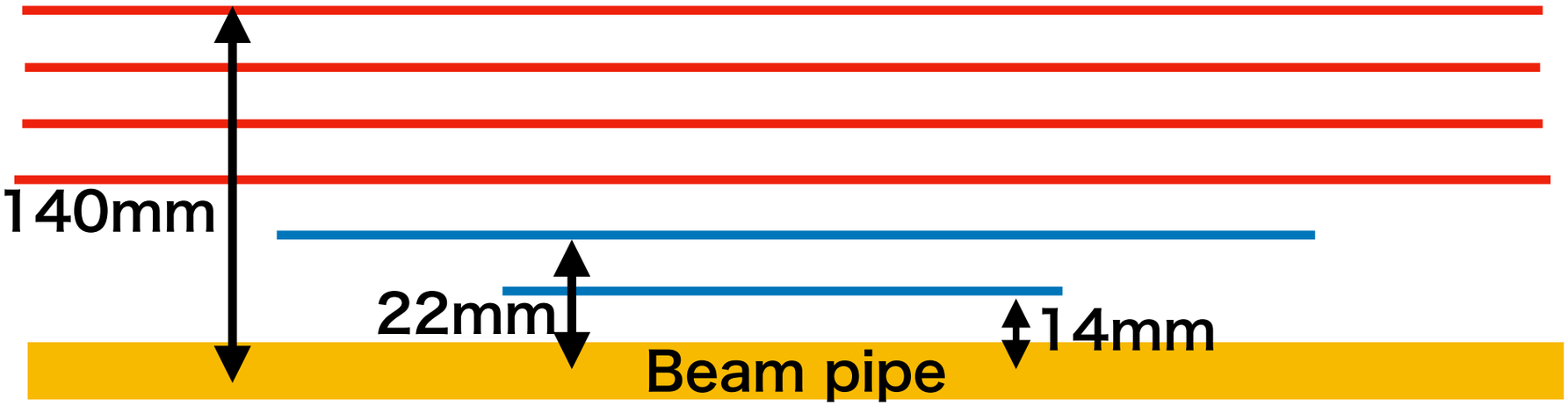
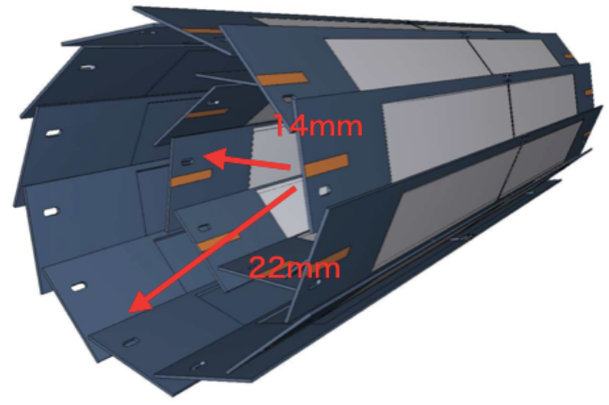
SOI Pixel detector for Belle II upgrade

Pixel detectors(PXD) in Belle II, is required to measure the two B decay vertices by reconstructing tracks with strip detectors(SVD).





Upgrade Requirement

Luminosity	4×10^{36} /cm^2 /s(6 times higher)
Background particle flux	113 MHz/cm^2
Trigger rate	150 kHz
Occupancy	0.1%

Upgraded SuperKEKB luminosity will be 6 times larger than now, it will make a tough background environment for PXD to reconstruct track. Development of next PXD need to consider these background challenge.

KEK SOPIX group develops a pixel detector for Belle II upgrade PXD.

My research in GPPU

Development of SOI pixel detector for Belle II upgrade.

Design

Chip design :
Analog circuit
Digital circuit
peripheral circuit

Geant4
simulation study

SOI sensors test

↓

MPW run(Multi-project wafer)

↓

Prototype chip completed

Evaluation

Beam test preparation → Beam test

Electric test

Infrared laser test

↓

Version up design

Present status

Present status

Got interesting simulation results	Start Digital design

PXD(pixel detector in Belle II is required to measure the two B decay vertices.

Before develop it, we need to know what sensor is perfect for Belle II upgrade.

Conclusion of my research :

- Pixel pitch 40 μm can keep a good resolution which is better than 10 μm.
- Time resolution is required to be designed to O(100 ns).
- Impact parameter ~ O(10μm)

Overseas training in GPPU

2020 Apr. ~ 2020 Oct. France . Strassbourg

IPHC (Institut Pluridisciplinaire Hubert CURIEN)

Delayed

Why I choose IPHC?

They also develop pixel detector for collider experiment, and they are collaborating closely with KEK SOI group.

Homepage (almost written in French) : http://www.iphc.cnrs.fr/-PICSEL-.html

DRS | Recherche au DRS » Du Big Bang aux particules » **PICSEL**

PICSEL

Physics with **I**ntegrated **C**mos **S**ensors and **EL**ectron machines

- CMOS Sensors

  - Principle of operation
  - CMOS Sensors and their applications
  - Publications and presentations
  - List of CMOS chips
  - Pictures of CMOS chips
  - Beam telescope
  - TAF package

What can I do in telework with IPHC?

- Studying on CMOS sensors.
- Learning how to design CMOS sensors.
- Make the digital library of SOI for them.