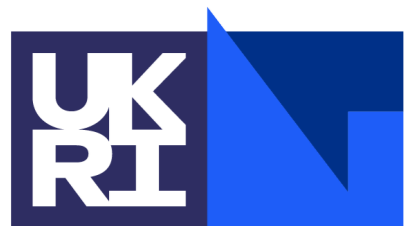


LHCb Upgrade

Atanu Modak

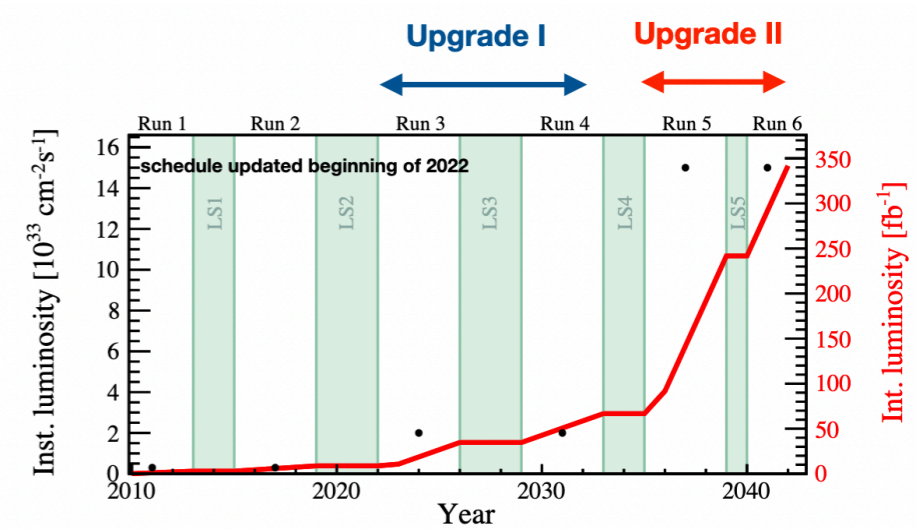
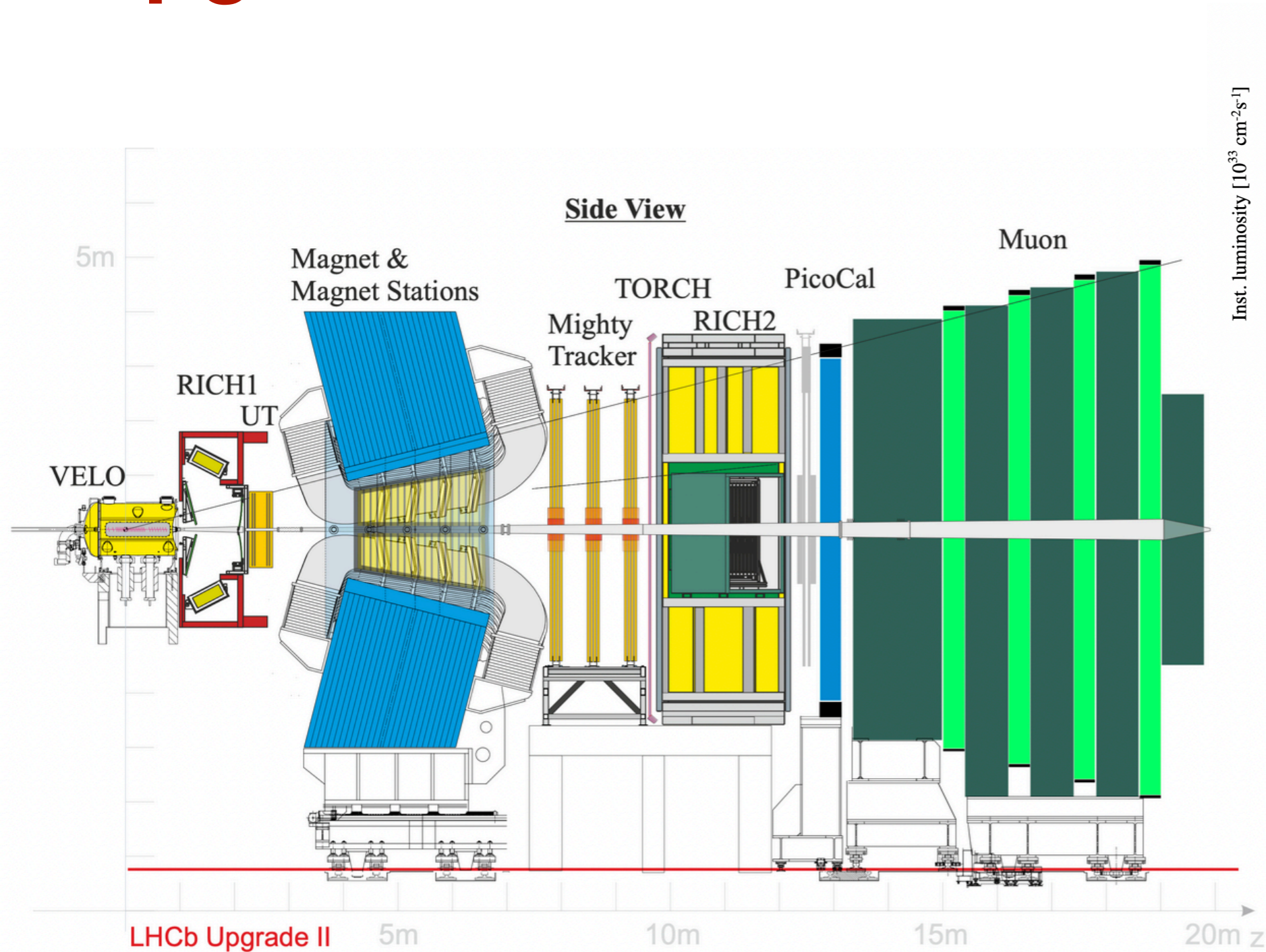
On behalf of the PPD-LHCb group



Science and
Technology
Facilities Council

Particle Physics

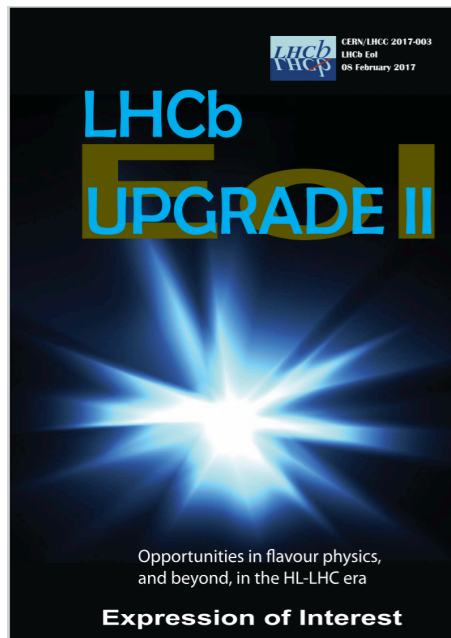
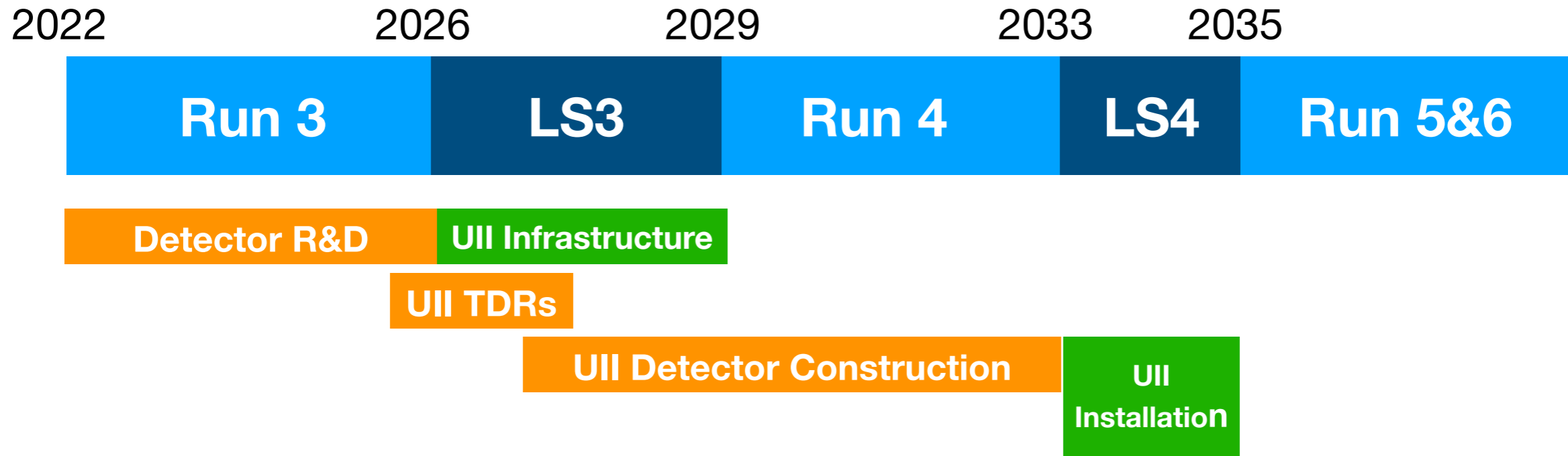
Upgrade II Detector



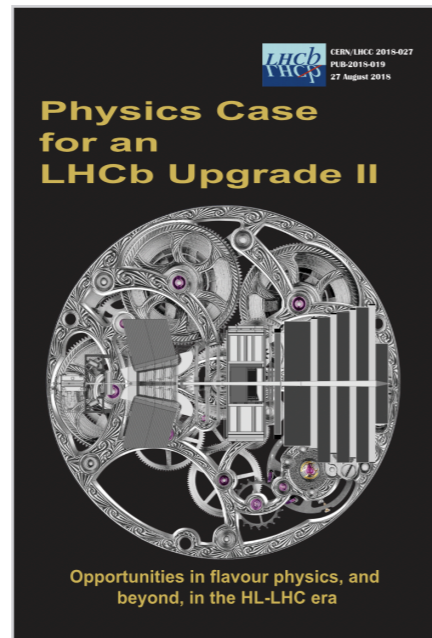
- $L_{inst} \sim 1.5 \times 10^{34} \text{ cm}^{-2}\text{s}^{-1}$
- PileUp increase ~ 6 to 40

PPD is involved in the RICH and Mighty Tracker project

Upgrade II Timeline



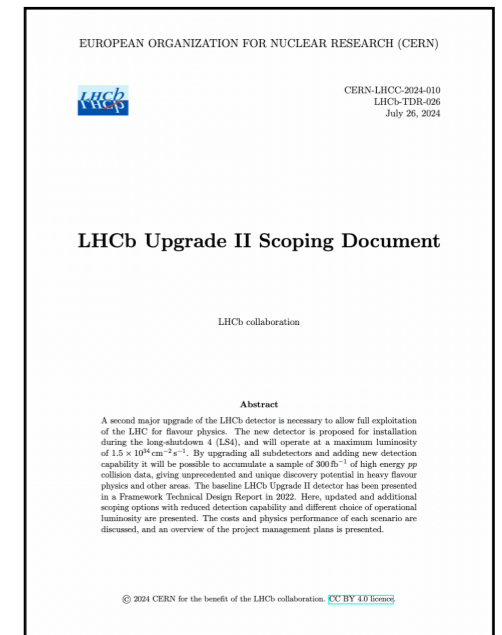
EoI in 2017



Physics Case in 2018



Framework TDR in 2021



Scoping Document in 2024

PPD Involvement

□ RICH:

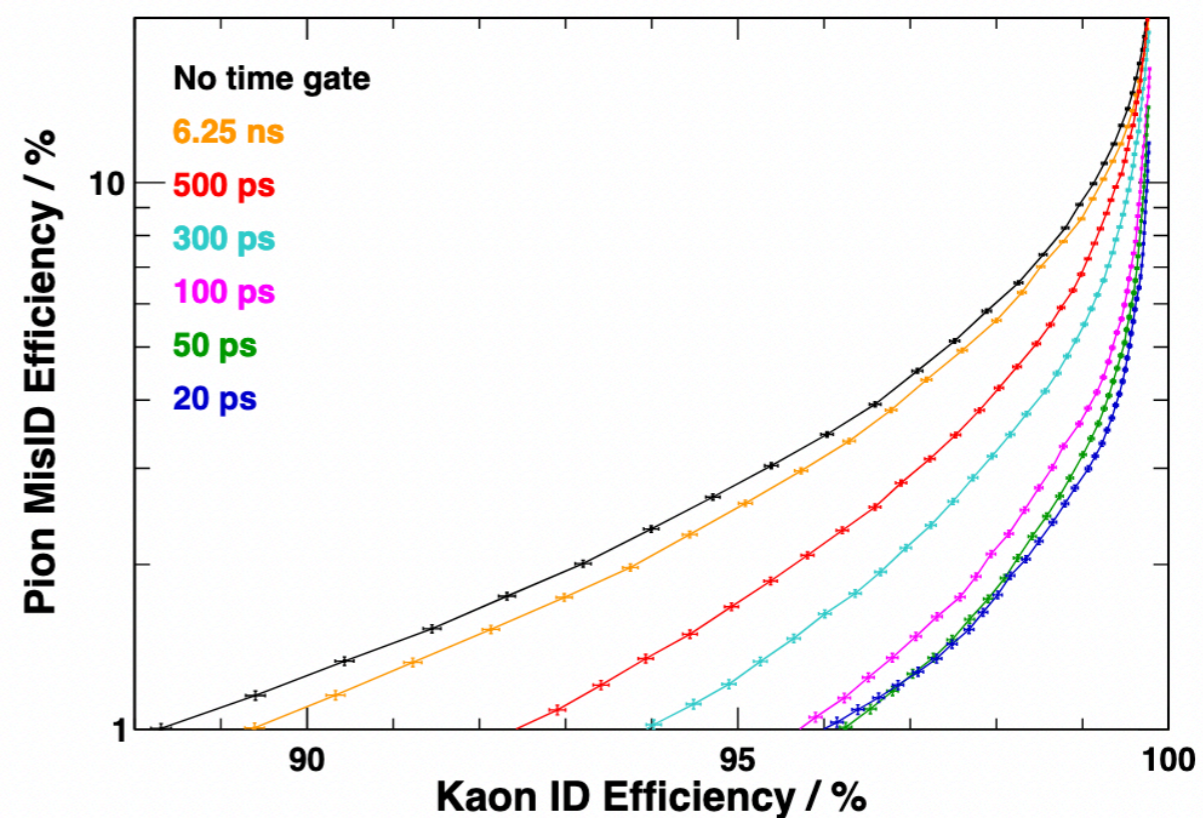
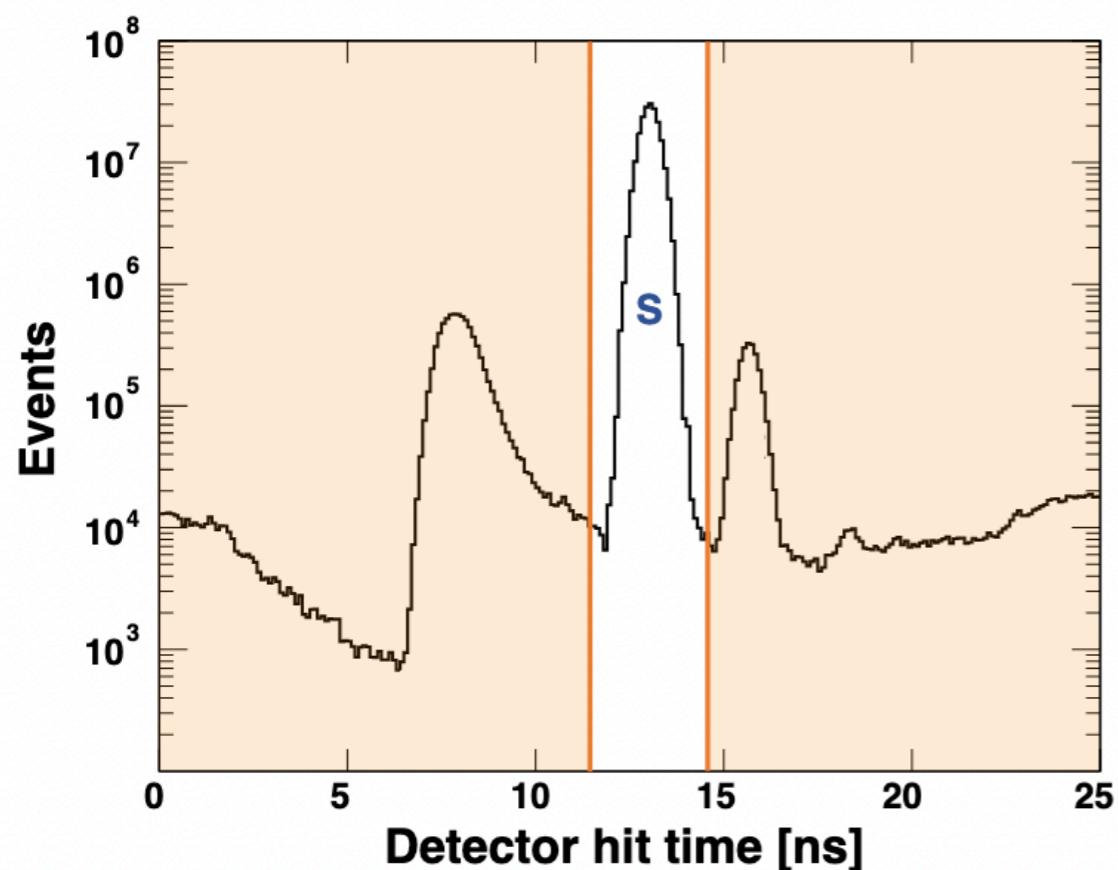
- Simulation
- Electronics Consolidation during LS3
- Silicon Photo-Multiplier R&D

□ MightyTracker:

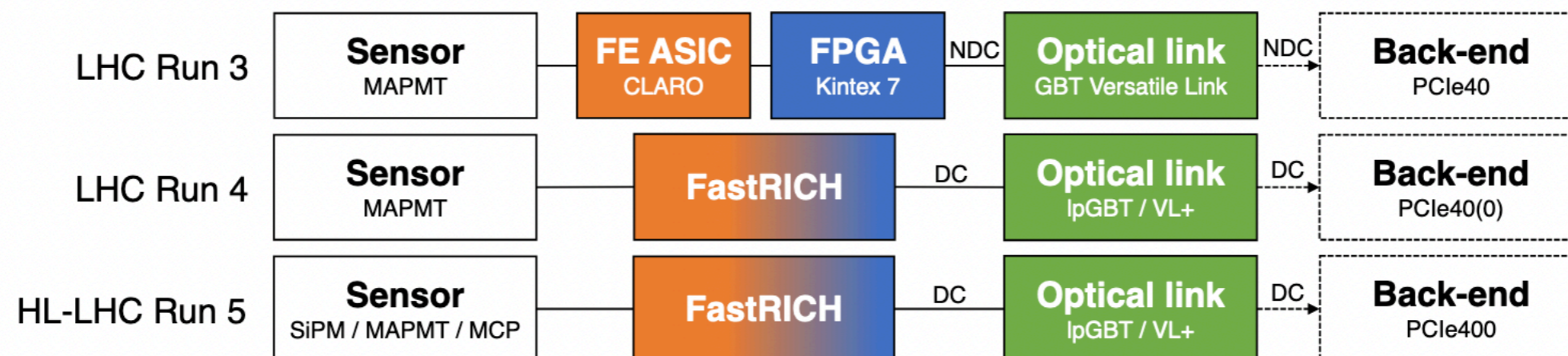
- Simulation
- Sensor and DAQ R&D
- Production Plan

RICH Simulation

PPD is responsible for the simulation of the performance of RICH design



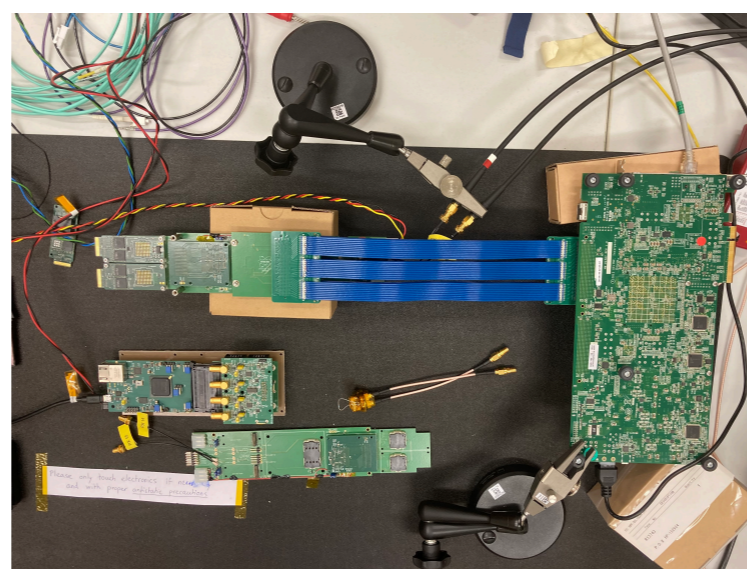
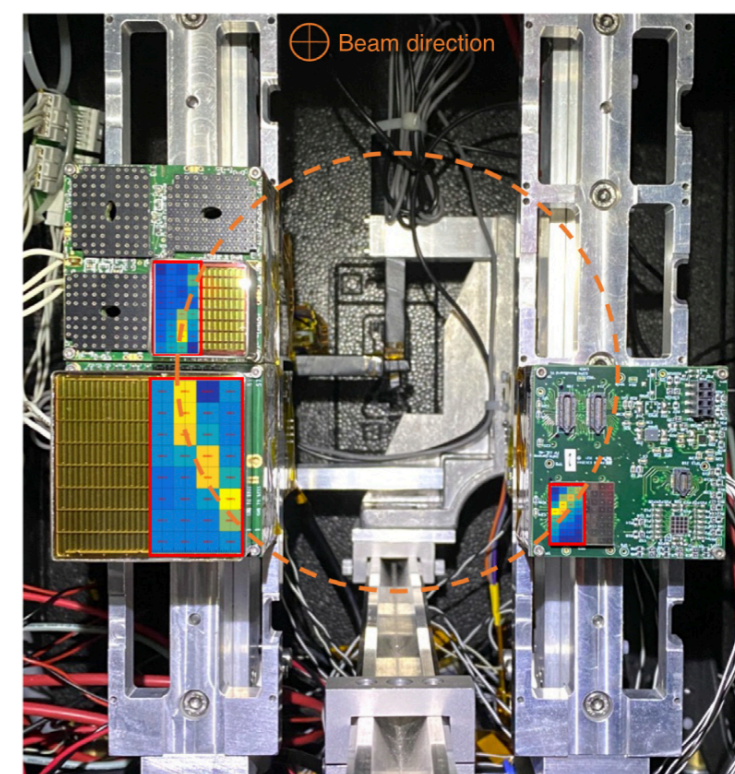
RICH Electronics in LS3



PPD is involved in

- ❑ Electronics chain R&D and test beam
- ❑ FastRICH ASIC characterisation
- ❑ WinCC based experimental control system development

Test beam setup

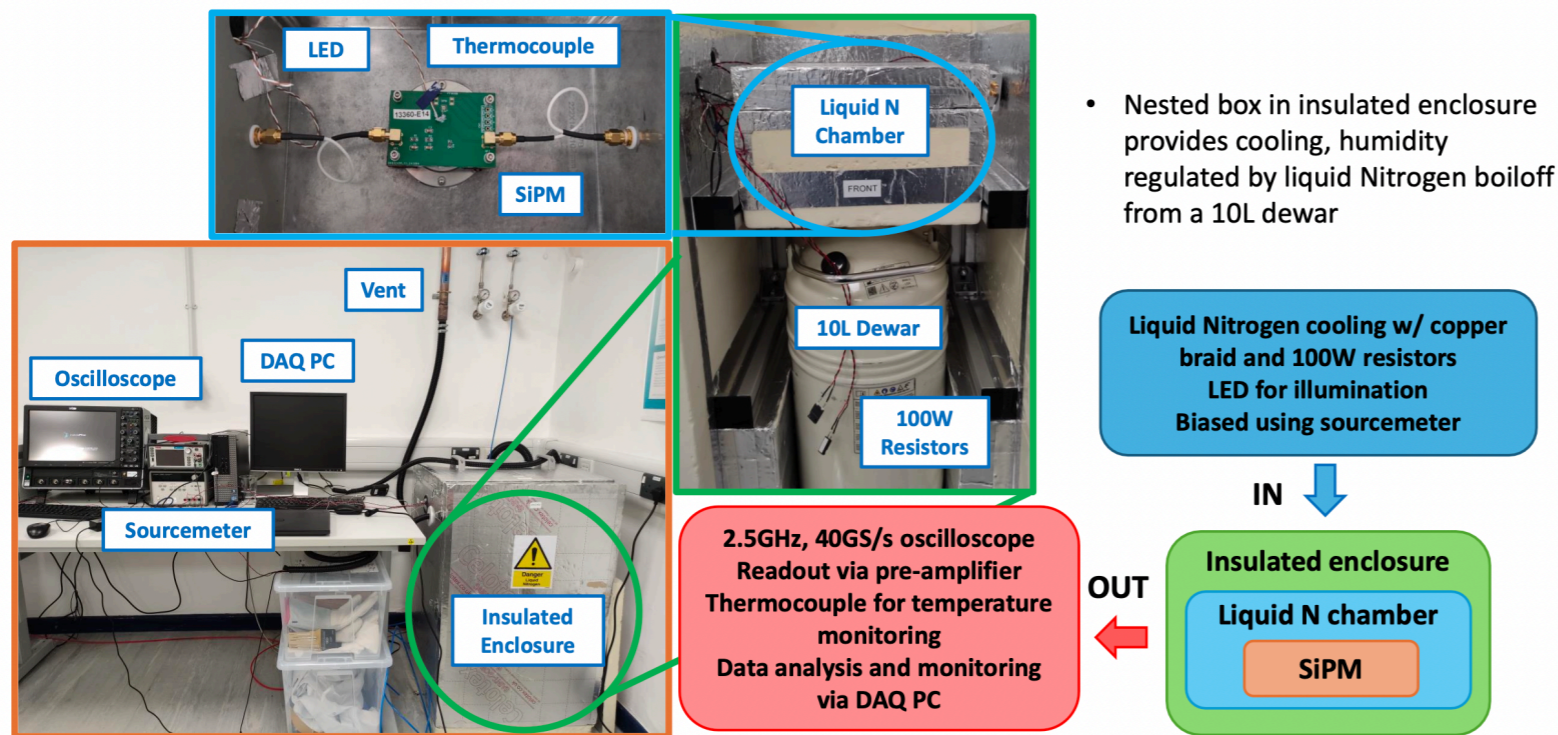


DAQ Chain

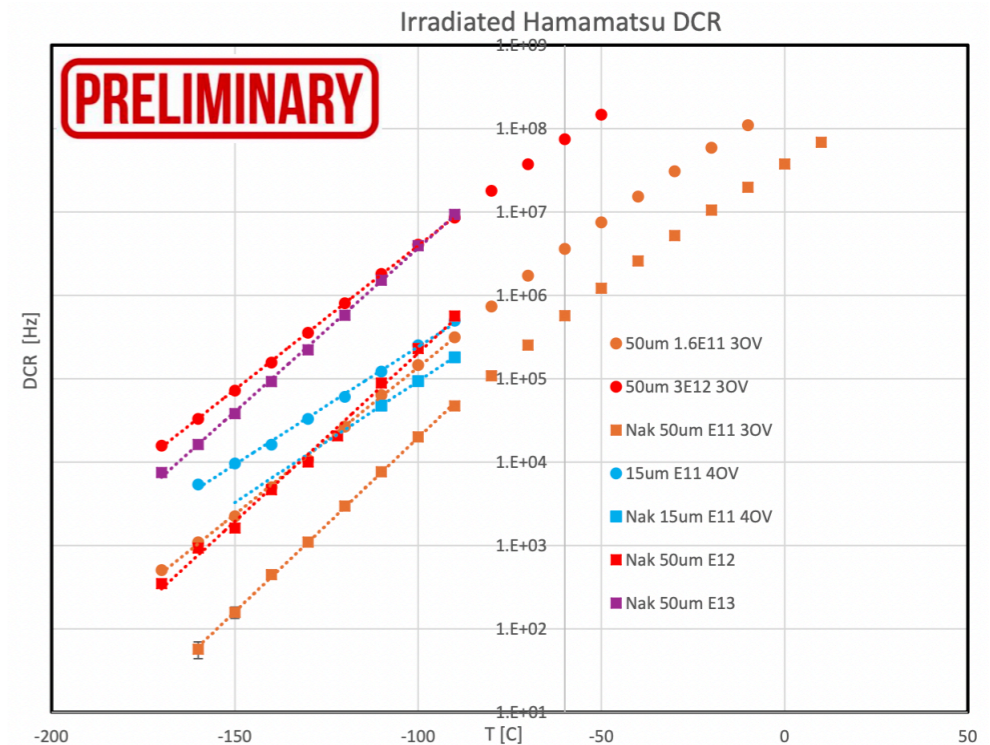
RICH SiPM R&D

PPD is involved in

- R&D of Hamamatsu SiPMs: irradiation behavior, temperature dependence of dark count rate



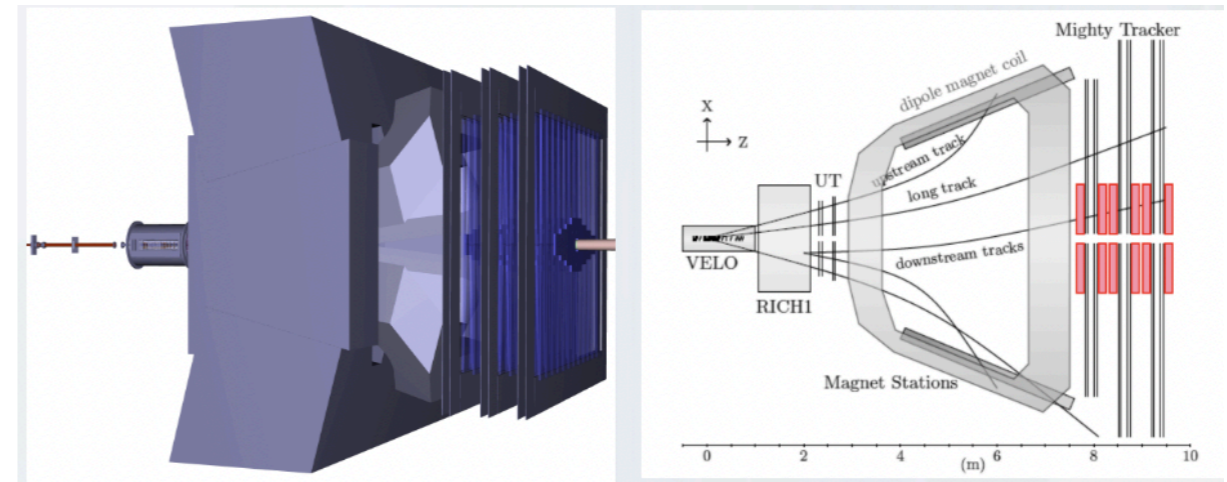
Cryogenic Setup



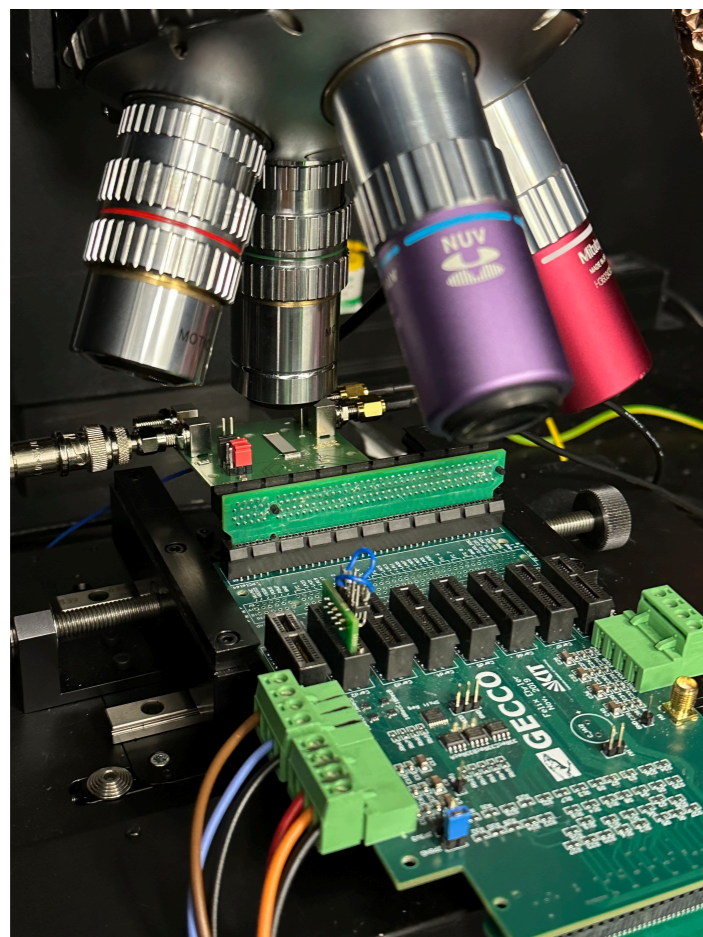
MightyPix R&D

Simulation:

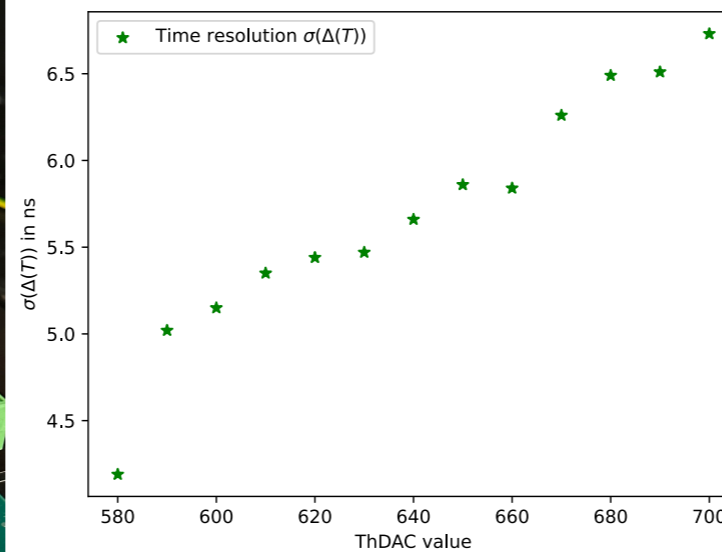
- PPD is one of main contributors in MightyPix geometry simulation



Sensor R&D in lab and test beam:



Sensor Time Resolution

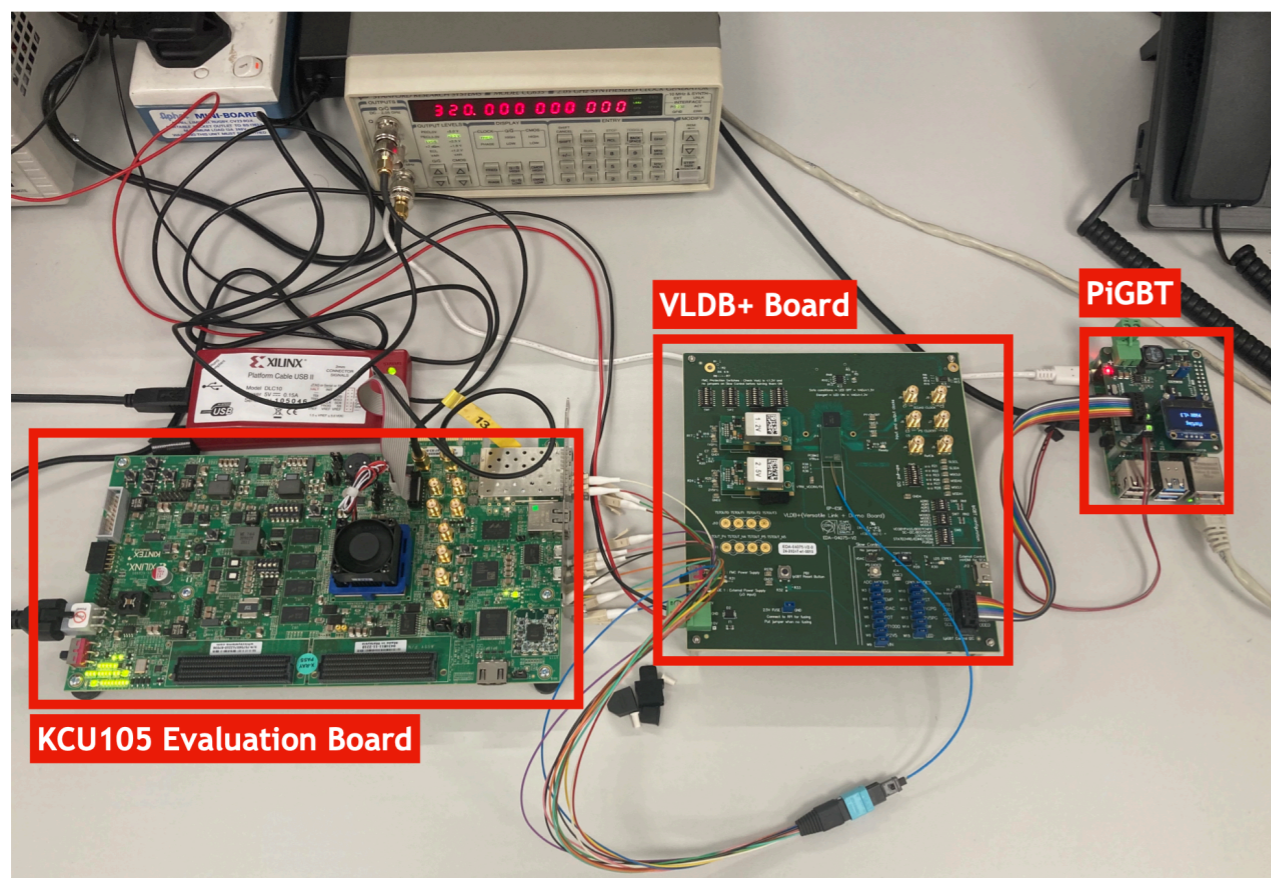


Sensor characterisation with Laser

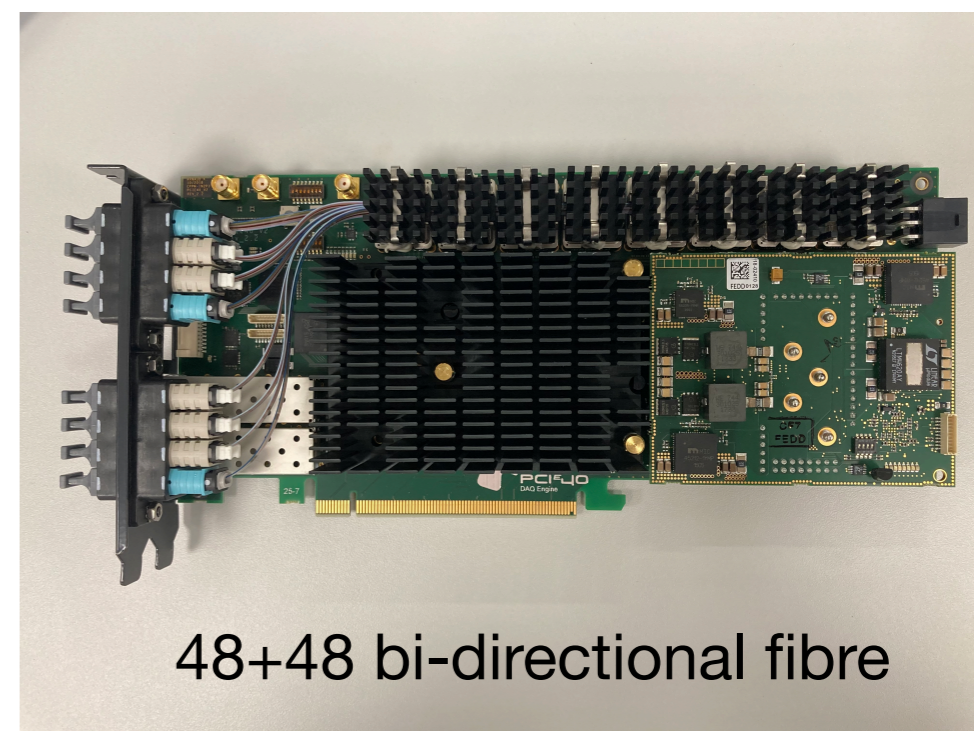
Total Ionisation Dose study

MightyPix DAQ R&D

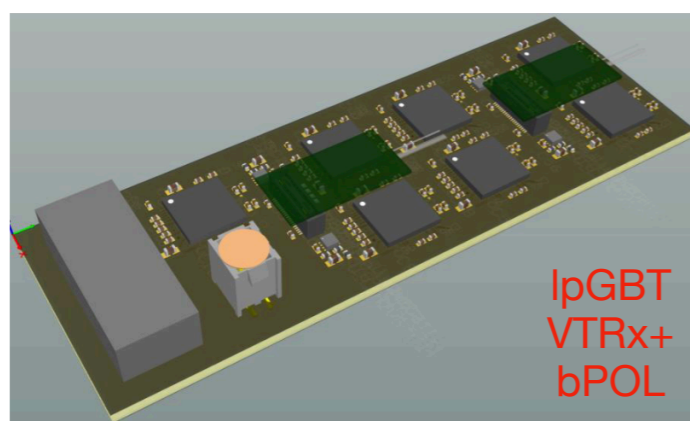
R&D on Data Acquisition Chain



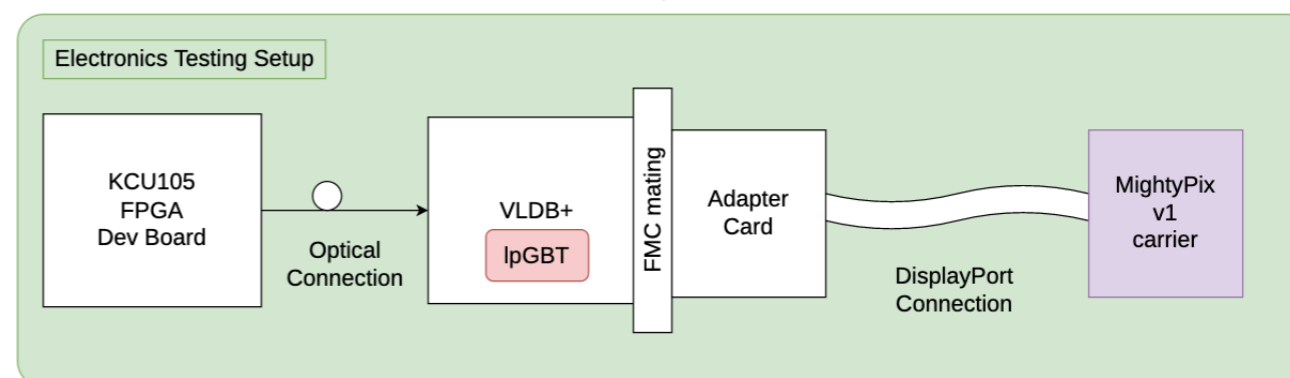
PCie40 based miniDAQ



Service Hybrid Prototyping



Full Chain DAQ Demonstrator

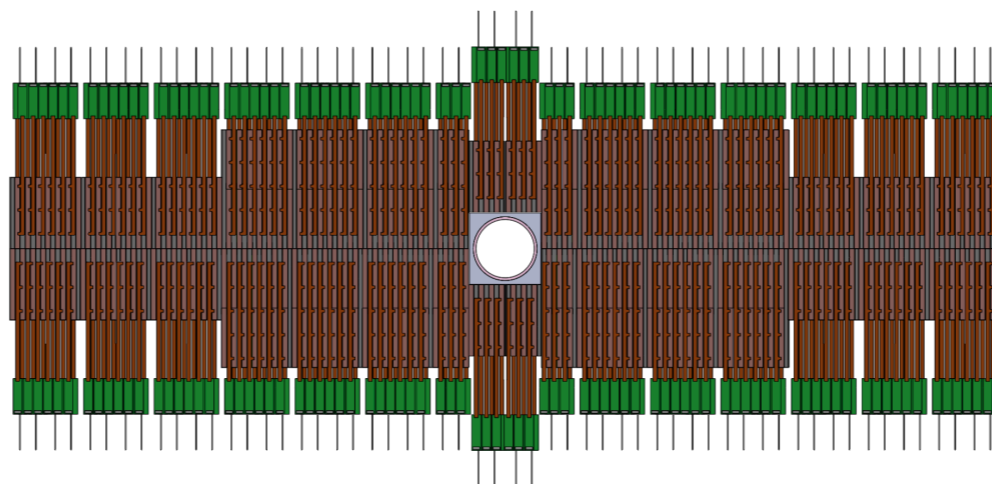


MightyPix Production Plan

Flip-chip bonder for chip to flex assembly



Planning R&D with TD

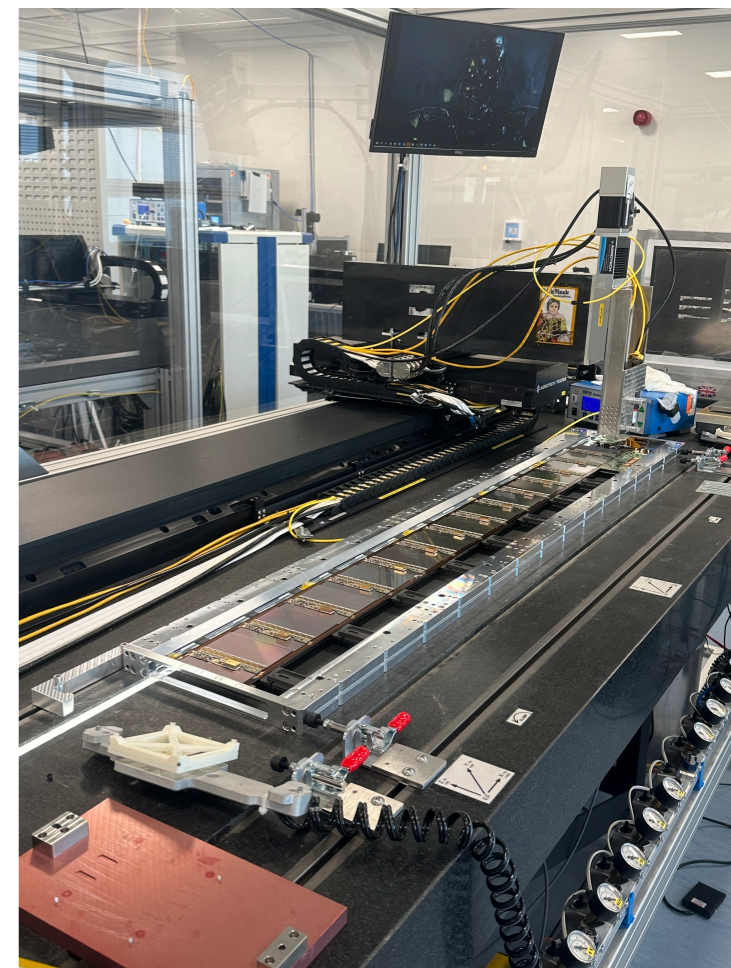


6 Layers of HV-MAPS,
13 m² of silicon area



PPD aims to play a lead role in the construction of this detector

ITk gantry for module assembly



Thank You 