Data analysis and characterization of the CE65 v2 CMOS sensor prototypes for High Energy Physics

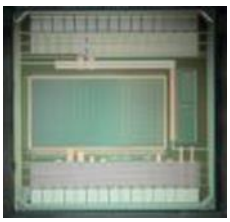
CMOS (Complementary Metal-Oxyde Semiconductor) pixel sensors are widely used as trackers in particle physics experiments due to their high granularity and low material budget. Nowadays they are considered as favourite candidates for the trackers of future Higgs factories (FCC/ILC) as well as sensors for various medical and societal applications.

Their tiny pixel size enables to reach spatial resolution of the order of few micrometers. Moreover, the fabrication technology of CMOS sensors is still progressing by pushing the limit of the circuits printing resolution which reduces the pixel size and enables to improve the detection performances in terms of spatial resolution, efficiency as well as readout rate.

Picsel group and C4PI platform have a very good expertise in the R&D of CMOS sensors and their characterization in laboratory as well as on irradiation facilities.

In collaboration with CERN, a set of CMOS sensors built in the so called TPSCo 65 nm technology has been produced in 2023 with various pixel sizes and doping variants (CE65 v2 prototypes). Laboratories and test beams at CERN and DESY are going to be performed in 2023-2024. The main objective of the internship is to validate the robustness of the technology, to evaluate the sensors performances in terms of spatial resolution, detection efficiency, fake rate and radiation tolerance, etc.

The student will mainly participate to data analysis and evaluate the performances of the sensors for their various variants, using the Corryvreckan software. For this, programming skills (C++/Python) are an advantage.



CE65 prototype

Nom, prénom et grade des responsables de stage :

Ziad El Bitar (DR2)
Téléphone: **03 88 10 63 81**
Email: **ziad.elbitar@iphc.cnrs.fr**

Auguste Besson (MdC HC)
Téléphone: **03 88 10 64 45**
Email: **auguste.besson@iphc.cnrs.fr**

Composition de l'équipe PICSEL : **Jérôme BAUDOT (PR), Auguste BESSON (MdC HC), Ziad EL BITAR (DR2), Serhiuy SENYUKOV (IR2), Emmanuel MEDERNACH (IR1), Ajit Kumar (Postdoc), Ali Altingun (Postdoc), Gaëlle SADOWSKI (Doctorante), , Hasan DARWISH (Doctorant), Elias EL HABER (Doctorant).**

Nom du responsable et intitulé du laboratoire d'accueil: ***Sandrine COURTIN (IPHC)***
Adresse : ***Institut Pluridisciplinaire Hubert Curien (IPHC)***
23 rue du Loess, BP 28 – 67037 STRASBOURG CEDEX 2