

Characterization and analysis of the first fully integrated A-SiPM with on-chip time conversion: Blumino sensor

Semester project

General Information

Laboratory: Advanced Quantum Architecture Laboratory (AQUA)

Partners: EPFL

Supervisor: Andrada Muntean, Prof. Edoardo Charbon

Location: Microcity, Neuchâtel

Starting date: ASAP

Contacts: andrada.muntean@epfl.ch, edoardo.charbon@epfl.ch

Description

The objective of this project is to characterize and analyse the performance of the first fully integrated analog silicon photomultiplier used in Blumino, a sensor designed for positron-emission-tomography (PET). The system comprises an A-SiPM developed by On-Semiconductor, with excellent photon detection efficiency (PDE) at 420nm (48%) designed for PET, an integrated time-to-digital converter (TDC) and comparator. This work is divided in three different areas: electrical, optical and radiation characterizations. The system is optically characterized in terms of single-photon timing resolution (SPTR), photo detection efficiency (PDE), dark count rate (DCR) and crosstalk. Coincidence resolving time (CRT) measurements are performed in order to determine the system performance PET. One of the major goals is to investigate the impact of integrating CMOS circuits along with the A-SiPM monolithically. We compare the obtained results with previous characterisations in order to detect any possible performance degradations due to the integration.

Tasks

- Lab experiments
- Optical and electrical tests
- Analysis of the final results