

ELECTRICAL, ELECTRONICS AND COMMUNICATIONS ENGINEERING

INFN - Novel sensor concepts and architectures for low-power CMOS fully-depleted MAPS

Funded By	ISTITUTO NAZIONALE DI FISICA NUCLEARE [P.iva/CF:04430461006]
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Context of the research activity	<p>The National Institute for Nuclear Physics (INFN), operating under the ministry of university and research (MUR), is the Italian research agency in charge of studying the fundamental constituents of matter and the physical laws defining their behaviour. To fulfil its mission, INFN develops novel radiation detectors, based on customised sensors and dedicated front-end electronics. The use to state-of-the-art CMOS image sensor technology allows to implement novel lightweight photon and charged particle sensors featuring low-power embedded readout electronics for future detectors in fundamental physics experiments, space instruments and medical applications. The development of such CMOS monolithic sensors requires very detailed simulations of the internal electric fields using TCAD tools and process information and design kits provided by the silicon foundry. The pixel or strip arrays are deployed in reticle-size system-ready CMOS sensors with on-chip digitisation and data processing, which will be sent for fabrication and tested during the PhD program.</p>
Objectives	<p>The research will contribute to the development of new sensor concepts for image sensing and energy harvesting, readout architectures and integration techniques. The PhD candidate will work on the TCAD simulation and design of innovative sensor concepts for CMOS active pixel sensors with energy harvesting capabilities, front-end circuit design, chip integration and sign-off of monolithic ASICs for space applications and medical instrumentation.</p>
Skills and competencies for the development of the activity	<p>Knowledge of TCAD software suites and flows for semiconductor design and simulation, CMOS technology fabrication and integrated circuit design. A MSc in in Physics or Electronics Engineering is required.</p>