MASTER THESIS PROJECTS @ IFAE PIXEL GROUP

TITLE: New Silicon Detector Technologies for the LHC Experiments

PROJECT DESCRIPTION: In the next years, the LHC accelerator at CERN (Switzerland) will be improved to deliver more collisions per unit time and thus probe the energy frontier in search of new physics. The ATLAS and CMS experiments will also need to upgrade their detectors to be able to cope with the higher occupancies and radiation environment. The IFAE Pixel group is working within ATLAS to develop the next generation of silicon detectors that instrument the core of the LHC experiments: 3D devices for ultra-high radiation hardness, depleted CMOS monolithic sensors, and devices with charge multiplication for timing applications. The sensors from these different technologies are fabricated or designed at the UAB campus and characterized by the group before and after irradiation at the laboratory and beam tests at CERN. The selected student will participate in the characterization of one or more of these technologies. The foreseen tests involve the study of charge collection with radiation sources and lasers, and the determination of electrical properties using different readout systems (electronics). The possibility to finance participation in beam tests at CERN will be explored.

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TITLE: Depleted CMOS Detectors for Medical Applications

PROJECT DESCRIPTION: Semiconductor detectors are being increasingly used in medical applications and, in general, as imaging systems. These devices are usually finely segmented, with a pixelated two-dimensional array geometry. The signal generated in each pixel of the sensor by the incoming radiation has to be collected, amplified and processed. These detectors are usually fabricated through a dedicated process. The IFAE Pixel group is developing a new generation of silicon devices for radiation detection that is based on the commercially available High Voltage (HV) CMOS technology. Given the cost effectiveness of these devices and their successful usage in high-energy experiments, it is only natural to explore its potential for photon detection and imaging applications. The selected candidate will participate in the development and characterization of a new generation of HV-CMOS monolithic photon sensors.

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