

## Recent developments on LGAD and iLGAD detectors for tracking and timing applications

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The objective of this work is the development of new position sensitive detectors with low signal amplification useful also for timing applications and called Low Gain Avalanche Detector (LGAD). These new devices are based on the standard Avalanche Photo Diodes (APD) normally used for optical and X-ray detection applications.

We will present the two dimensional numerical simulation based on Sentaurus and Silvaco simulation tools and the technological steps needed for the fabrication. In this talk we will present two different approaches for the fabrication of these devices. First a single side n-on-p detector that collect and amplify electrons and second a double sided p-on-p detector that collects holes and amplify electrons.

Silicon pads, microstrip and pixelated sensors have been fabricated at the clean room facility of the Centro Nacional de Microelectrónica in Barcelona with a small signal gain in order to reduce their thickness without reducing the charge collected signal amplitude keeping the same signal to noise ratio. This allows using the standard readout front-end electronics without signal saturation.

This work was developed in the framework of the CERN Rd50 collaboration and the investigation carried out on these detectors provides important indications on the ability of such modified electrode geometry to control and optimize the charge multiplication effect, in order to fully recover the collection efficiency of heavily irradiated silicon detectors.

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