

Technological Developments on iLGAD Detectors for Tracking and Timing Applications

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This presentation introduces the latest technological development on the Inverse Low Gain Avalanche Detector (iLGAD). This structure is based on the standard Avalanche Photo Diodes (APD) concept that includes an internal multiplication of the charge generated by radiation. The multiplication is inherent to the basic n

++

-p

+

-p structure, where the doping profile of the p

+

layer is

optimized to achieve high field and high impact ionization at the junction. In order to ensure a uniform electric field distribution along the device, the iLGAD is a pad-like LGAD with P-type multiplication layer below the N⁺ implant, in which we change the P⁺ implantation, by several P-type strips in order to segment the readout electrode, like a P-on-P microStrip detector. In this structure, we move the multiplication layer to the back-side of the chip, and define the ohmic readout elements, strips & pixels, in the front-side, as shown in Figure 1. That means the collecting current is dominated by holes instead of electrons.

This kind of device with inner amplification allows us to reduce the substrate thickness in order to develop a low-mass tracking systems with thinner microstrips sensors conserving the same SNR. iLGAD structures could be interesting for tracking and timing applications, as well as for primary interaction vertex or medical applications.

In this work we will present the basic technological steps and the last characterization results of the first iLGAD fabricated at CNM.

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