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Latest Developments for Low Gain Avalanche Detectors (LGADs)

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Low Gain Avalanche Detectors (LGADs) are thin silicon detectors (20 to 50 μm in thickness) with moderate gain (up to ˜50). LGADs have good time resolution (˜17 ps), fast rise time (˜500ps), and short full charge collection time (˜1ns), which are suitable for numerous future applications.

The first implementation of LGADs will be with the ATLAS and CMS detectors in preparation for the HL-LHC. The primary challenge is to produce radiation hard LGADs that can withstand fluences up to 3e15 n_{eq}/cm^2. In this talk, we will report on the results of radiation campaigns with neutron and proton irradiated LGADs produced by FBK and HPK.

Another ongoing project for LGADs is to achieve higher granularity. In this talk, we will explore varieties of newly-proposed LGAD designs that can potentially achieve the granularity goal of 50x50 μm^2. These approaches include AC-coupled LGADs, Trench-Isolated LGADs, Inverted-Junction LGADs, and a new approach: the Deep-Junction LGADs.

Funding information

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