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# 18 MeV Proton Irradiation of Low Gain Avalanche Detectors

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The LGAD technology is of great interest for high-energy physics (HEPs) as a 4-D tracking device and has been qualified for use in the timing detectors of the CMS and ATLAS experiments for the high luminosity upgrade of the LHC (HL-LHC). During the operation in strong radiation fields, the radiation damage progressively leads to performance degradation of LGADs, which therefore need a more profound theoretical understanding and further design optimizations.

The following study presents the results of 18 MeV proton irradiation conducted at the cyclotron of the Bern University Hospital. The investigation of radiation-induced degradation produced by low energy protons is of special interest since it demonstrates the limits of the Non-Ionizing Energy Loss (NIEL) scaling. LGADs produced by Hamamatsu Photonics (HPK) as well as devices with differently carbonated gain layers produced by Centro Nacional de Microelectrónica (CNM)-IMB are included in the study.

Electrical characterization, radiation-induced acceptor removal and gain reduction as well as timing measurements of a a selected subset of samples will be presented. In addition, an outlook with comparison to similar devices irradiated at CERN with 23 GeV protons will be discussed.

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