MATTER AND TECHNOLOGIES

Contribution ID: **6** Type: **not specified**

Low Gain Avalanche Diodes for Beam Monitoring and T0 Determination in HADES

Wednesday, 28 September 2022 10:15 (15 minutes)

Low Gain Avalanche Diodes (LGADs) are fast sensors allowing the detection of particles with high time and spatial resolution, thus enabling the so-called 4D particle tracking. Due to their high radiation hardness and low material budget, LGADs are excellent sensors for in-beam detectors used for example for beam monitoring and reaction time (T0) determination in high-rate High Energy Physics (HEP) experiments.
An in-beam detector based on LGADs was used in a high-rate pp production beam time in February 2022 at the High Acceptance Di-Electron Spectrometer (HADES). The LGAD sensors consisted of 96 half-strips with a pitch of 387 µm. They were successfully used for beam macro- and micro-spill structure and position monitoring during the beam time. In addition, the precise timing information will be used to assist in the Time-Of-Flight (TOF) based particle identification in HADES.

In this contribution, the LGAD sensors constituting the in-beam detector will be introduced and the calibration process as well as the sensor performance will be presented. In addition, an outlook on further ongoing activities will be given.

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Session Classification: Morning session