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LGAD technology for beam monitoring and medical applications

Sensors based on Low Gain Avalanche Diode (LGAD) technology enable high precision timing and position measurements. Paired with a high radiation hardness as well as low production costs, LGAD sensors represent excellent candidates for in-beam detectors, such as beam structure monitoring, but also for various tracking applications. They are currently used for both ATLAS and CMS experiments for their future timing detectors towards the high luminosity LHC upgrade program. Using highly segmented LGADs, timing precision below 50 ps were demonstrated, proving their aptness for these purposes. These properties make LGADs an excellent candidate for medical applications such as radiotherapy monitoring or imaging for particle therapy. We will discuss a new project using LGAD sensors for monitoring, diagnostic and energy measurement of high rate proton beams delivered by the Accelerator Facilities at iThemba LABS. A test bench involving multiple configurations of LGAD sensors is used for real-time monitoring to mimic realistic conditions of Flash radiotherapy. The outcome would help designing an integrated LGAD+ASIC prototype involving multiple disciplinary expertise for medical applications.

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