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Performance studies on thin LGAD sensors after proton irradiation

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For the high luminosity LHC or Phase-II operation, the ATLAS and CMS experiments are planning to include especial detector in order to perform timing measurements of minimum ionizing particles (MIPs). Both detector will be exposed to a radiation levels up to $3E15$ neq/cm² and will required a timing performance of about 30 ps. Under these circumstances, Low Gain Avalanche Detectors (LGADs) are one of the sensing technologies under study with more promising results.

Therefore, a radiation hardness study of LGADs manufactured at CNM and proton irradiated at PS up to fluences of $3E15$ neq/cm² was performed. The effect of a gain layer doped with carbon on 50-micon LGAD sensors was studied. Also, two different active thicknesses were studied: 35-micron and 50-micron. The timing performance was evaluated with MIPs in a test beam and measured in a dedicated set-up with an infrared laser in the lab. These studies were performed within the RD50 collaboration and founded by AIDA2020.

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