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## Performance studies of CNM LGADs on Si-Si and epitaxial wafers irradiated to extreme fluences up to $1e16$ neq/cm<sup>2</sup>

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The fast rising signal of LGADs with high signal-to-noise ratio is key to achieve an excellent charge collection and time resolution for Minimum Ionizing Particles (MIPs). The LGAD technology will be used for the HL-LHC in the upgrade of both ATLAS and CMS timing detectors.

A full characterization of CNM LGADs on Si-Si and low resistivity epitaxial wafers irradiated up to  $1e16$  neq/cm<sup>2</sup> will be presented. LGADs are first electrically characterized on probe stations at room and at cold temperature. From the IV and CV characteristics parameters such as leakage current, full and gain layer depletion and breakdown voltages are studied. The rate of self pulses without an external source is measured to determine the maximum operational voltage. Measurements with a Sr-90 radioactive source are performed to study charge collection and timing from MIPs. Other parameters such as noise, jitter and rise time have been studied. The collected charge and time resolution performance is also studied at different bandwidths to understand how these parameters could be eventually affected by the readout.

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