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## Characterization of Low Gain Avalanche Diodes Using Diverse Particle Beams

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Low Gain Avalanche Diodes (LGADs) are silicon sensors renowned for their ability to deliver fast timing, especially in high energy and nuclear physics. They achieve a timing resolution of 20-30 picoseconds through an internal multiplication process that creates a controlled avalanche of charge carriers, producing a gain of 10-100. Some variants of LGADs can also track particle trajectories with great precision. While most research has focused on how LGADs respond to energetic charged particles, this work expands the study to include non-minimum-ionizing particles like low-energy protons, alpha particles, X-rays, and gamma-rays. This is crucial for future applications in fields like biology and medical physics. The study compares the LGAD's response, including its gain, to these different particle beams with results from TCAD simulations.

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