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study of deep carbonated LGAD at IHEP

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Low Gain Avalanche Detectors (LGADs) are crucial for high-energy physics applications, especially in the harsh radiation environments of future colliders. This abstract introduces LGADs enhanced with deep carbon implantation, emphasizing their superior radiation tolerance.

LGADs achieve high temporal resolution and precise spatial measurements through an internal gain mechanism and fine structure. The deep implantation of a carbon layer significantly enhances performance by protecting the boron gain layer from deactivation caused by irradiation. This protection is critical for maintaining detector efficiency and longevity.

Our proton irradiation campaign demonstrates that deep carbon implanted sensors exhibit outstanding performance, with better charge collection efficiency and smaller gain deterioration after 80 MeV proton radiation exposure up to $2.5 \times 10^{16} n_{eq}/cm^2$ compared with shallow carbon implanted devices. These improvements ensure consistent and reliable operation in high-radiation environments, making LGADs with deep carbon implantation a pivotal advancement.

This presentation will delve into LGAD operation principles, merits and drawbacks of deep carbon implantation, and experimental results showcasing enhanced performance in radiation tolerance.

Type of presentation (in-person/online)

online presentation (zoom)

Type of presentation (I. scientific results or II. project proposal)

I. Presentation on scientific results

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