

42nd RD50 Workshop on Radiation Hard Semiconductor Devices for Very High Luminosity Colliders (Montenegro)

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Deep-Junction LGAD and adaptive gain layer RD50 proposal

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Low Gain Avalanche Detectors (LGADs) are silicon detectors with modest internal gain (up to ~ 50) and great time resolution (20 ps). In a broad array of fields, including particle physics (4-D tracking) and photon science (X-ray imaging), LGADs are a promising R&D path. However, due to structures required to provide electrostatic isolation between LGAD pixels, the granularity of production-level devices is limited to the $1 \times 1 \text{ mm}^2$ scale. Applications in particle physics and photon science demand granularity scales of $100 \times 100 \text{ um}^2$ or better. In this talk, we'll present a solution to the granularity issue, the deep junction LGAD (DJ-LGAD). The concept behind DJ LGAD and its potential to increase the granularity of LGADs will be explained. Furthermore the concept of 'adaptive gain layer' using DJ-LGAD technology will be presented, this type of gain layer might allow a significant increase of the radiation hardness reach of LGAD devices. Finally, a production of such a device in the scope of RD50 will be proposed.

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