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Silicon Carbide LGAD RD50 common project

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Silicon Carbide (SiC) has been known for more than 100 years and was investigated as detector material already 20 years ago. Nowadays, it gets again attention and momentum since the chip industries started to use SiC as substrate material for energy-efficient power devices to foster the energy revolution.

Silicon Carbide particle detectors have some advantageous properties compared to silicon, like very low leakage current due to its higher band gap, also after irradiation, which avoids the need for cooling. Moreover, the material is potentially more radiation-hard due to a higher lattice atom displacement energy. It is insensitive to visible light, and its signals are very fast. On the downside, the active thicknesses are currently limited due to the epitaxial substrate growth process.

In this presentation, the current status of work to investigate SiC as detector material is presented. We show CCE measurement results of neutron-irradiated SiC pad diodes tested by UV-TCT and Alpha radiation. Moreover, we discuss how SiC is implemented in TCAD and other simulation software. Finally, the proposed RD50 common project to develop a SiC-LGAD sensor is being presented.

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