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# TCAD Investigation of AC-LGAD

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Low Gain Avalanche Diode (LGAD) detectors are entering the mainstream as sensors planned for use in future particle detectors. However, their granularity is limited due to the need to isolate separate segments (strips or pixels) of the detector through the gain layer, limiting the granularity scale to approximately 1 mm. However, AC-coupled LGADs (AC-LGADs), also known as resistive silicon detectors (RSDs), provide solution to this limitation by reading out the detected particles through capacitive (AC) coupling through a thin passivation layer. The signal is collected temporarily under the surface electrodes through the use of a resistive n+ junction layer. In this way precise timing is maintained, while precise position resolution is obtained through a combination of higher granularity and charge sharing between neighboring segments. In this work, we share the results of parametric investigation of strip AC-LGADs using two independent Technology Computer Aided Design (TCAD) tools: SilvacoTM Victory DeviceTM and SynopsysTM SentaurusTM. Results on the signal size and delay as a function of distance from the strip center are presented, and compared between each other as well as with test-beam data taken with a high-energy proton beam. Conclusions are drawn about the suitability of the use of TCAD simulation tools in the refinement of the design of AC-LGAD sensors.

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