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Improvement of timing resolution and radiation tolerance for finely segmented AC-LGAD sensors

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Capacitive-coupled Low-Gain Avalanche Diode (AC-LGAD) is a semiconductor tracking detector with precise timing resolution and spatial resolution developed by KEK and Tsukuba group collaborating with Hamamatsu Photonics K.K. (HPK). A 100 μm x 100 μm pitch pixel type sensor and 80 μm pitch with 10mm length strip type sensor with 50 μm active thickness have been successfully developed with fully uniform gain across sensor active area while 50 μm x 50 μm pitch pixel type sensor must be working based on simulation although hard to test without readout ASIC. In this presentation we will discuss two things a) the timing resolution improvement by the thinner active thickness sensor (20 μm) b) improvement of radiation tolerance with the gain layer modification to minimize acceptor removal effect to operation voltage increase.

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