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Timing and spatial performance of IHEP AC-LGADs

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AC-coupled Low- Gain Avalanche Detectors (AC-LGAD) are designed as detectors with 100% fill factor for high precision 4D-tracking, which have been studied and researched by many institutes including BNL、FBK et al. Their results show that timing resolution of AC-LGAD can be lower than 50ps and spatial resolution can be better than 10um. Standard LGAD sensors of the Institute of High Energy Physics (IHEP) already showed time resolution better than 35ps before irradiation. Recently IHEP developed our first AC-LGAD sensors. This talk will present the simulation and latest testing results about 50um thick IHEP AC-LGAD sensors. Simulation studies of process parameters including the n+ layer dose and oxide thickness and their effect to signal shape will be shown. Meanwhile, simulation studies about charge sharing between AC-LGAD pixels with different pad-pitch structures will also be shown. Time resolution for the sensors tested by using Beta source are better than 50ps which is close to standard LGADs with similar gain. Spatial resolution of sensors with different pad-pitch structures tested by using laser system will also been shown.

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