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Spatial resolution of IHEP AC-LGADs with different process and structure design

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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. Institute of High Energy Physics (IHEP) has also done many researches on AC-LGAD. First IHEP AC-LGAD sensors with a pitch of 2000 μm and AC pad of 1000 μ show time resolution better than 20ps, and spatial resolution better than 16um. Testing results show that as the N+ doping dose decreases from 10 P to 0.2 P, the spatial resolution is reduced from 33 μm to 15 μm. Details of the results will be discussed. Second version of IHEP AC-LGAD be fabricated, lower than 0.2P n+ layer dose be used for improve the spatial resolution and sensors with different pad-pitch structures also be fabricated. Testing results show that as decreasing the n+ layer dose from 0.2P to 0.02P, the spatial resolution of AC-LGAD can be lower than 8um. Strips with different pad-pitch structures be fabricated and studied, results show that pad-pitch structures will also affect the spatial resolution. Testing results of IHEP AC-LGAD v2 sensors tested by using laser system will also be shown.

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