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# Results for pixel and strip centimeter-scale AC-LGAD sensors with a 120 GeV proton beam

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We present the results of an extensive evaluation of strip and pixel AC-LGAD sensors tested with a 120 GeV proton beam, focusing on the influence of design parameters on the sensor temporal and spatial resolutions. Results show that reducing the thickness of pixel sensors significantly enhances their time resolution, with 20 µm-thick sensors achieving around 20 ps. Uniform performance is attainable with optimized sheet resistance, making these sensors ideal for future timing detectors. Conversely, 20 µm-thick strip sensors exhibit higher jitter than similar pixel sensors, negatively impacting time resolution, despite reduced Landau fluctuations with respect to the 50 µm-thick versions. Additionally, it is observed that a low resistivity in strip sensors limits signal size and time resolution, whereas higher resistivity improves performance. This study highlights the importance of tuning the n+ sheet resistance and suggests that further improvements should target specific applications like the Electron-Ion Collider or other future collider experiments. In addition, the detailed performance of four AC-LGADs sensor designs is reported as examples of possible candidates for specific detector applications. These advancements position AC-LGADs as promising candidates for future 4D tracking systems, pending the development of specialized readout electronics.

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