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Development of AC-LGADs for large-scale high-precision time and position measurements

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We present measurements on AC-LGADs (aka Resistive Silicon Detectors RSD), a version of LGAD which has shown to provide spatial resolution on the few 10's of micrometer scale. This is achieved by un-segmented (p-type) gain layer and (n-type) N-layer, and a di-electric layer separating the metal readout pads. The high spatial precision is achieved by using the information from multiple pads, exploiting the intrinsic charge sharing capabilities of the AC-LGAD provided by the common N-layer.
Using focused IR-Laser scans directed alternatively at the read-out side and the bias side, the following detector parameters have been investigated in RSD produced by FBK: sheet resistance and termination resistance of the n-layer, thickness of the di-electric, doping profile of the gain layer, and pitch and size of the readout pads.
The data are used to recommend a base-line sensor for near-future large-scale application with need for precision timing and position resolution (e.g. EIC)

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