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Spatial and timing resolution of an RSD2 sensor measured at the DESY beam test facility

In this contribution, the performance of a Resistive Silicon Detector (RSD) measured with 4 GeV electrons at the DESY beam test facility is presented. The device-under-test comes from the second RSD production manufactured at FBK (RSD2). The RSD2 sensors feature a different design with respect to the previous production (RSD1), in order to improve the sharing of signals produced by ionizing particles and minimize the area covered by the read-out pads, which are both key elements to achieving excellent spatial and temporal resolution.

In this work, a 2x2 RSD2 with 1.3 mm pitch has been measured at room temperature in the T24 line at DESY, using a EUDET pixel telescope to provide the reference hit position with 10-15 μm resolution; the reference timestamp, instead, is provided by an MCP with ~ 15 ps resolution. The spatial and timing information have been obtained from the RSD2 sensor using both standard methods and machine learning techniques, and then compared with the reference ones, in order to assess the spatial and temporal resolution of the device. The sensor has been read out by a 16-channel fast analog board developed at FNAL, using a CAEN digitizer.

I will describe the sensor design and the DESY beam test facility, and I will present the spatial and timing results obtained at different bias voltages.

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