

High Voltage Monolithic Active Pixel Sensors for the MOLLER Experiment

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The MOLLER experiment aims to measure the parity-violating asymmetry (APV) in electron-electron scattering at 11 GeV, and thus determine the weak charge of the electron to a high precision (2.4%). Two of the key sub-systems in the experimental apparatus are the main detector array, consisting of 224 fused silica detector modules and electron beam Compton polarimeter. The main detector array can be operated in either pulse mode for particle tracking, or integration mode for high rate detection. A sub-section of these detector modules will be equipped with an array of High Voltage Monolithic Active Pixel Sensors (HVMAPS), to be used in particle tracking and allowing for real-time monitoring of the event profile in the main Moller region. HVMAPS chips are also used for the Compton polarimeter, consisting of four-plane planes of HVMAPS chips, housed in a vacuum chamber upstream of the interaction point. I will provide an overview of the main detector and Compton polarimeter, with a focus on the implementation of the HVMAP sensors, the integrated electronics cooling design, and the engineering, manufacturing and assembly of the detector modules.

Collaboration

The MOLLER Collaboration

Role of Submitter

The presenter will be selected later by the Collaboration

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