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Neutron sensitive Microchannel Plate with a Timepix3 readout

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We present a neutron-sensitive MicroChannel Plate (MCP) detector integrated with a Timepix3 readout system. This study aims to combine the high gain and low background noise of the MCP with the excellent time and position resolution of the Timepix3. The MCP is doped with boron-10, which captures neutrons and decays into lithium ions and alpha particles. Within the microchannels, these charged particles are converted to electrons and amplified. The Timepix3 readout, offering a time resolution of 1.56 ns and a spatial granularity of 55 µm, is positioned very close to the MCP to collect the signal and record the neutron positions. Utilizing four Timepix3 chips results in an active area of 28 mm x 28 mm. The detector is sensitive to thermal neutrons, and previous studies indicate that the detector can achieve up to 10 µm spatial resolution with more than 50% thermal neutron detection efficiency. These features make our detector a promising candidate for neutron imaging and radiography applications.

Currently, the mechanical construction of the detector is complete, and vacuum and high voltage tests have been performed. We are now focusing on the design of the electronics and the integration of the Timepix3 readout. This poster will present the principles, construction stages, and future plans for our neutron-sensitive MCP detector system.

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Sitzung Einordnung: Mounting Posters, Beer and light Dinner

Track Klassifizierung: Instrumentation & Data Management