

Novel neutron detectors with high spatial and time resolution and their readout electronics

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Thermal neutrons are used in different fields as archaeology, cancer therapy, material science or fundamental particle physics. To enhance capabilities of neutron facilities, the development of high precision thermal neutron detectors and their readout electronics is indispensable. Due to Helium-3 shortage, new detector concepts are sought.

The Bonn group transfers well-understood Micro-Pattern Gaseous Detectors (MPGDs) from particle physics to precisely detect neutrons: Gas Electron Multipliers (GEMs) and the Time Projection Chamber. We will evaluate Micro Channel Plates (MCP) in the future. The readout electronics is common to all projects and we employ the Scalable Readout System, developed by the RD51 collaboration. For the neutron TPC and MCP detectors, the Timepix3 pixel chip is used, while the VMM chip reads out the GEM-based detector anode strips.

Detector concepts and their application in thermal neutron detection are shown, followed by presenting the readout electronics.

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