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## Particle Physics Readout Electronics and Novel Detector Technologies for Neutron Science

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Traditional thermal neutron detectors are based on Helium-3 as conversion and detection material due to its large neutron cross-section.

In light of the upgrade and construction of several neutron scattering facilities such as the European Spallation Source (ESS) and a simultaneous shortage of Helium-3, new detection technologies have been introduced. The most prominent one is to use solid converters with a large thermal neutron cross-section such as Gadolinium and Boron. Those material emit charged particles when hit by a neutron. The technique then relies on detection and/or tracking of the charged particle, as in detectors of particle physics. At the same time, this requires an increase of the readout channels by an order of magnitude with the advantage to also increase the position resolution by the same amount compared to traditional neutron detectors. A prime example is the Gadolinium Gas Electron Multiplier (GdGEM) detector for the NMX instrument at ESS jointly developed by the CERN Gaseous Detector Group and the ESS Detector Group.

In this contribution, some of our efforts to transfer particle physics detector and readout electronics to neutron science will be presented.

We employed the VMM chip, originally designed for the ATLAS New Small Wheel upgrade, to read out a GEM-based neutron detector. The Timepix3 chip is employed in a neutron Time Projection Chamber as well as to read out a neutron sensitive Micro-Channel Plate detector. Those readout chips are integrated in the Scalable Readout System of the RD51 collaboration.

### Collaboration

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