

SRS: A general purpose readout system and one example of application at the NMX instrument for ESS

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The European Spallation Source ERIC (ESS) currently under construction in Lund will become the brightest neutron source in the world opening new opportunities in different fields of research like material science or biology once the user program starts in 2023. Due to the Helium-3 crisis, several instruments will employ new detector technologies with solid converters. A prototype for one instrument, the NMX macromolecular diffractometer, developed by the gaseous detector development group at CERN is based on Micro Pattern Gaseous Detectors (MPGDs). The detector with an active area of 50 x 50 cm² uses a Gadolinium neutron converter as cathode of a micro-TPC with 10 mm drift, a triple Gaseous Electron Multiplier (GEM) amplification stage and a two-dimensional strip anode. Data are collected by the multi-purpose Scalable Readout System (SRS) of

the RD51 Collaboration. Within the Horizon2020 projects BrightnESS and AIDA2020, RD51 has decided to implement the VMM ASIC developed by BNL for the ATLAS New Small Wheel (NSW). The SRS-VMM will become the backbone of R&D in MPGDs for the next decade and replace the successful APV25 based readout, which was used in many projects like the CMS GEM upgrade QA, ATLAS NSW and drove the research within RD51 in the last eight years. The presentation will introduce the ESS and developments for NMX at CERN and then focus on the SRS-VMM readout system in general also giving an overview of the current APV25 standard readout. Several groups have signed up to apply SRS-VMM in their experiments and some of those applications will be presented briefly as well as upgrade plans for the readout system.

Michael Lupberger studied physics at the Universities of Freiburg and Aberdeen and carried out the research for the diploma thesis at CEA Saclay before graduation with Prof. Markus Schumacher in Freiburg. He then joined Prof. Klaus Desch's detector development group in Bonn to proof the feasibility of the Pixel-TPC, a Time Projection Chamber read out with the Timepix ASIC implemented in the Scalable Readout System (SRS), in the framework of the International Linear Collider R&D. He obtained his PhD from Bonn University in 2016 and worked on the ATLAS ITk project for a short time, before he went to CERN as an Applied Fellow. In the Gaseous Detector Development group he continued his work on the SRS to implement the VMM ASIC.