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SRS VMM and SRS Timepix3 as platforms for particle detectors

Within the last years, the VMM and Timepix3 ASICs were implemented into the general purpose Scalable Readout System (SRS). Both flavours of the SRS will be presented. They are continuously improved and extended to increase their field of application.

Already with prototypes of these systems, detectors for different applications were read out during test beams of R&D towards the employment in experiments as NMX at the ESS, MAGIX in Mainz, GBAR at CERN or Beam Gas Vertex (BGV) monitors for the HL-LHC. The adaptation of the SRS to some projects will be outlined together with a glance at the experiments.

Summary

The Scalable Readout System (SRS) of the RD51 collaboration, introduced 2009 with the APV25 front-end ASIC, is a general purpose data acquisition system. It includes the full readout chain from the front-end chip and FPGA-based data concentration to data acquisition software. Due to its architecture, SRS is scalable from small laboratory systems to the size of a large experiment.

Within the BrightnESS project and supported by AIDA2020 and the Detector Group of the European Spallation Source (ESS), the recently completed VMM ASIC was implemented into SRS by the Gaseous Detector Development (GDD) group at CERN.

At the same time, the Timepix3 chip was implemented in the SRS at Bonn University supported by AIDA2020. Both flavours of SRS are targeted towards different applications due to the complementary of the front-end ASICs.

While the Timepix3 project in Bonn is focused to R&D for BabyIAXO and a Pixel-TPC for the ILC, the VMM implementation was primarily targeted to the NMX instrument at ESS. However, due to the general design of SRS, both system can be adapted to different applications and have raised interest by many groups mainly from the gaseous detector community.

Examples are the MAGIX experiments planned at a new accelerator at Mainz University, the GBAR experiment at CERN or Beam Gas Vertex (BGV) monitors for the HL-LHC. Common test beams with groups coordinating the R&D for those projects have been carried at at CERN's SPS or the MAMI accelerator. The results are entering the technical design reports or grant applications with SRS as the baseline solution.

The presentation will introduce the concept of the SRS, with a focus on the latest implementation of the Timepix3 and VMM ASICs and ongoing improvements of the systems. Some of the upcoming experiments and R&D projects will be outlined together with required adaptations of the SRS in the future.

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