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Application of the VMM3a/SRS for tracking systems and TPCs

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The ATLAS/BNL VMM3a ASIC (Application Specific Integrated Circuit) was originally developed within the ATLAS New Small Wheel (NSW) upgrade and has been successfully integrated into the SRS (Scalable Readout System) of the RD51 collaboration. This integration provides a self-triggered continuous readout system for a wide range of gaseous detectors. Depending on the detector it is for example possible to switch the polarity, adjust the electronics gain or even change the peaking time. The system allows recording particles with MHz interaction rate in energy, space and time.

The first part of the contribution will exploit the possibility to integrate the VMM3a into a tracking system of an experiment. Because of the rate capability and self triggered readout the VMM3a is considered as a potential front end electronics for the new triple GEM detectors of the AMBER experiment. This contribution will show results of an AMBER prototype, read out with the VMM3a/SRS system. It will be shown how the VMM3a can help to understand and commission a new prototype. Even without a track reference it is possible to perform a basic detector characterisation, due to the self-triggered readout mode.

The second part explores the possibility to use the VMM3a as front end electronics for a TPC.

Thanks to the trigger-less readout there is no long buffer needed until the trigger signal comes to indicate the event in the data. The VMM3a can provide all time and amplitude information continuously and allows for offline track reconstruction of the data. This aspect is even more interesting by using a TPC in the TWIN configuration. For this data of the TWIN GEM TPC will be presented. In this configuration, in combination with the VMM3a, it allows reconstructing tracks without any external t0. Thus this presents a possibility of an extremely low material budget tracking system, suitable for tracking of low energy particle beams.

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Author: FLÖTHNER, Karl Jonathan (University of Bonn, Germany, CERN, Geneva, Switzerland)

Co-authors: KETZER, Bernhard (University of Bonn, Germany); JANSSENS, Djunes (CERN); PFEIFFER, Dorothea (European Spallation Source ERIC (ESS)); SAULI, Fabilo (CERN); BRUNBAUER, Florian (CERN); GARCIA, Francisco (HIP, Helsinki, Finland); ORLANDINI, Giorgio (CERN); MULLER, Hans (CERN ; University of Bonn, Germany); SAMARATI, Jerome (European Spallation Source ERIC (ESS)); FLÖTHNER, Karl Jonathan (University of Bonn, Germany ; CERN, Geneva, Switzerland); ROPELEWSKI, Leszek (CERN); SCHARENBERG, Lucian (CERN); LISOWSKA, Marta (CERN); HEISS, Michael (PSI); STENIS, Miranda Van (CERN); ERALDO, Oliveri (CERN); VEENHOF, Rob (CERN)

Presenter: FLÖTHNER, Karl Jonathan (University of Bonn, Germany, CERN, Geneva, Switzerland)

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