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Test results on the n-XYTER ASIC, a self triggered, sparcifying readout ASIC

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n-XYTER is a 128 channel asynchronous, self triggered, self sparcifying readout ASIC developed as a front-end for neutron scattering detector applications. Due to the novel architecture it has attracted a considerable interest from future heavy ion experiments around the FAIR project. In particular for CBM and PANDA, n-XYTER is currently seen on one hand as the basis and starting point for a dedicated ASIC development on its own. On the other hand it will serve as the prototype readout electronic front-end for broad detector prototyping efforts that have just started and will span from silicon strips to gas detectors.
The first dies of the n-XYTER ASIC are currently under thorough and intensive tests, so that the test results on operation and performance will be presented. Further, an outlook for FAIR related applications will be given.

Summary

Increasing demands for readout channel numbers as well as general rate capability finally iniciated a push for on-chip integration of front-end electronics
in the thermal neutron scattering community as well. The typical neutron scattering application introduces the additional challenge of generally asynchronous, poisson distributed events. To address the statistical nature of neutron events, a novel self triggered, entirely data driven, derandomizing and sparsifying readout architecture was developed and cast in silicon as a 128 channel neutron detector readout chip. The analogue pre-amplifier and shaping circuit was designed for a noise performance below 1000 ENC at 30 pF input capacitance. The ASIC provides readout bandwidth for an average signal rate of upto 32MHz, where pulse hight, time of incidence and channel number are registered. Though engineered for a specific application, these specifications correspond perfectly well to the demands imposed upon a front-end when MIPs are to be detected in typical silicon strips.
Additionally, the data driven and sparcifying readout architecture turned out to attract considerable attention in the heavy ion community of the future FAIR project, where mere event rates and multiplicities due to signal latencies impede the installation of any low level trigger facilities. n-XYTER has grown to be the readout ASIC prototype for FAIR and
in particular the CBM as well as the PANDA experiments. It will on one hand serve the basis for a dedicated ASIC development and on the other hand it will be employed for the broad detector prototyping efforts that have just started.
The first dies of the n-XYTER ASIC are currently under thorough and intensive tests, so that the test results on operation and performance will be presented.

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