

Development of the CoRDIA pixel detector ASIC for high-speed X-ray experiments

CoRDIA is a pixel detector being developed for X-ray experiments at future synchrotron light sources such as PETRA-IV. The extreme brilliance of these sources will enable new experiments scanning the structure of complex objects on length scales from macroscopic down to single atoms. To enable these experiments, CoRDIA is being designed to perform continuous image taking at 150.000 frames/s while achieving a large dynamic range and a pixel size of 110um. Its key building blocks consist of a per-pixel adaptive gain amplifier for high dynamic range, Analog-to-Digital Converters distributed throughout the pixel matrix for rapid digitization, and high-speed gigabit transmitters for high speed data transfer to the DAQ system. Thus far, ASIC test structures have been produced in a 65nm CMOS process to test the individual building blocks and small arrays of 16 pixels. These have confirmed the expected pixel performance in terms of noise, linearity and adaptive gain operation. Some cross-talk issues have been identified, and an updated shielded layout was designed to solve them.

Workshop topics

Front-end electronics and readout

Authors: Dr KLUJEV, Alexander (Deutsches Elektronen-Synchrotron); WUNDERER, Cornelia (DESY); PENNICARD, David; KRUEGER, Hans (University of Bonn); GRAAFSMA, Heinz; HAFIANE, Lamine; LANGE, Sabine; Dr WANG, Tianyang (University of Bonn); VANAT, Tomas (Deutsches Elektronen-Synchrotron (DE)); TRUNK, Ulrich; MARRAS, alessandro

Presenter: PENNICARD, David