

Front-end ASIC for detector readout with pre-amplifier, offset cancellation and ADC

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Preferred track : Additional instrument talks/critical technologies

SRON is running a development track on low-temperature front-end electronics aimed at application in EChO for the readout of NIR/SWIR MCT detectors. The project is nationally funded and the prototype chip will be available for testing in February 2014. The design is based on a mixed-signal ASIC. In the ASIC, the detector signals are amplified and digitized. Placing the front-end circuitry (amplifier, offset cancellation and ADC) in close proximity to the detector offers great advantages in signal integrity and immunity to electromagnetic interference (EMI).

The readout IC can be placed in close proximity to the detector, in the cryogenic temperature range around 55K, cooled beyond the range of standard electronics built from discrete components. The analogue signals from the detector need only travel a short distance with just a small thermal gradient. Furthermore the demands on mass, volume, and power budget are greatly reduced, and an ASIC allows for more flexibility in the board design and integration.

The analogue front-end is the heart of the ASIC and its quality is critical to the signal integrity. The development is focused on the pre-amplifier and the analogue-to-digital conversion (ADC) for the pixel signals. Requirements are high stability, low noise, high resolution and high sampling rate.