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A readout ASIC for a counting silicon microstrip detector used in a Compton polarimeter

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An ASIC capable of counting individual hits on a silicon microstrip detector used in a Compton polarimeter has been developed. Laser photons backscattered off an incident high-energy electron beam in the 3.5GeV electron stretcher ring ELSA at Bonn university are pair converted in a lead convertor and then detected on a silicon strip sensor. The sensor is read out by a mixed-signal ASIC that consists of 128 channels, each one having a charge sensitive amplifier with continuous reset, configurable pole-zero cancellation, a CR-RC shaper with variable shaping time, a comparator and a DAC to tune the comparator threshold. For each channel an asynchronous ripple counter and additional digital circuitry is available to count the number of hits and to serialize the counter reading. The digital circuitry uses differential current logic to minimize digital to analogue crosstalk and substrate noise coupling. The shaping time, the pole-zero cancellation and the TRIM-DAC is configured via an I2C interface. In this talk the detector system, the ASIC architecture and performance measurements will be presented.

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