



Contribution ID: 144

Type: **Oral**

## Development of the MYTHEN III microstrip detector

*Wednesday 10 July 2019 11:30 (15 minutes)*

The MYTHEN detector is a single photon counting microstrip detector with 50  $\mu\text{m}$  pitch developed at the Swiss Light Source for powder diffraction experiments [1]. After more than ten years of operation of MYTHEN II, a new readout chip MYTHEN III was designed in 110 nm UMC technology to upgrade the current detector. It is designed to improve all aspects, specifically noise performance, count rate capability, threshold dispersion and frame rate.

Each strip in the MYTHEN III chip features a dual polarity front end consisting of a charge sensitive amplifier and a shaper with variable gain and shaping time, as well as three comparators and gateable 24-bit counters. The internal counting logic allows for different modes of operation: energy-windowing, charge sharing suppression, count rate improvement and pump-probe with multiple time slots.

The first two prototypes have been tested in the lab and at the synchrotron. The noise is reduced to 175 electrons (-24% compared to MYTHEN II) and the untrimmed threshold dispersion was measured as 476 eV (-70% compared to MYTHEN II) [2].

Thanks to the three thresholds in the chip, we can exploit pile-up of the analog signal in the shaper at high photon flux and thereby reach a count rate of 25 MHz.

Based on these results, a full scale chip with 128 channels was developed and sent to production.

The architectures of the chips and characterisation results will be presented.

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**Session Classification:** Silicon, Pixel, chair: Val O'Shea

**Track Classification:** general