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First results of the MYTHEN-III strip detector prototype

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After more than ten years of operation, the MYTHEN-II detector at the Swiss Light Source (SLS) at the Paul Scherrer Institutut, Switzerland, is being upgraded. MYTHEN-II is a 60k-channel single-photon-counting 50µm pitch silicon microstrip detector optimized for powder diffraction experiments.
A new readout chip called MYTHEN-III is being developed by the SLS detector group in 110nm UMC technology. It is expected to improve the performance of the previous version in terms of noise, count rate capability, threshold dispersion and frame rate.
Every readout channel features a preamplifier and a shaper with variable gain and shaping time. The shaper output is fed to three independent discriminators, each one having a dedicated threshold, trim bit set and enable signal. The outputs of the three discriminators are processed by the counting logic section which, according to the mode of operation selected, generates the hits for the three following 24-bit counters. Several operation modes are foreseen: dual polarity, energy-windowing, count rate improvement, charge sharing suppression and pump with multiple probe time slots.
The first 64-channel prototype has been tested in the lab, with fluorescence X-rays and with a synchrotron beam to characterize its noise and count rate capability. The architecture of the chip and the first experimental results will be presented.

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