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JUNGFRAU: a pixel detector for Photon Science at free electron laser facilities.

JUNGFRAU (adJUstiNg Gain detector FoR the Aramis User station) is a 75um pitch pixel detector developed at the Paul Scherrer Institut for photon science applications at free electron laser (FEL) facilities, with particular focus on the in house project SwissFEL.
JUNGFRAU is a hybrid pixel detector with a charge integrating readout ASIC (Application Specific Integrated Circuit), characterized by single photon sensitivity and a low noise over a dynamic range of 10^4 12keV photons. The dynamic range and the noise performance (~52.e.n.c. rms in high gain) are enabled by a three gain, automatic switching preamplifier in each pixel, which dynamically adjusts, pulse by pulse and pixel by pixel, its internal gain to the amount of input charge.
Each JUNGFRAU module, which can be tiled to assemble multi-megapixel cameras, is composed of 8 readout ASICs and has a total active area of 4x8 cm^2 for a pixel count of 1024x512. The module can be readout at a maximum frame rate of 2kHz.
The design of the readout ASIC and of the module front-end electronics will be presented, together with the final detector setup at the SwissFEL endstations. The results of the module characterization, performed with X-Ray tube, synchrotron radiation and laser illumination will be reported.

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