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A bump-bondable DSSC Pixel Readout ASIC for DEPFET Sensor Matrices at the European XFEL

The DSSC (DEPFET Sensor with Signal Compression) consortium develops a 1MPixel detector for low energy X-rays at the European XFEL. The XFEL will produce 10 bursts per second, each containing 2880 X-ray pulses with a repetition rate of 4.5 MHz. X-ray photons of 0.5 – 6 keV are absorbed in hexagonal DEPFET pixels of 229 × 204 µm2 pitch with a nonlinear characteristic to achieve a high dynamic range. The sensors will be bump-bonded to readout ASICs of 64 × 64 pixels. Each pixel contains a filter with trapezoidal weighting function, a single slope ADC of 8-9 Bit resolution and a digital memory to store 640 events. A veto mechanism allows to discard uninteresting events. The analog part is powered down and the digital hit data is read out serially during the ≈ 100ms long burst gaps. The first fully functional bump-bonded prototype matrix chip of 16 x 8 pixels has been characterized electronically and with nonlinear DEPFET sensors. The ASIC architecture, the control, readout and veto mechanisms and an outlook to the large 64 x 64 pixel chip will be presented.

quote your primary experiment

European XFEL

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