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Calibration and Performance of the First Depfet Ladder of the DSSC X-ray Imager

Monday, 27 May 2024 19:00 (20 minutes)

A modified Depleted P-Channel Field Effect Transistor (DEPFET) providing non-linear signal response is the distinctive feature of the 1 Mpixel DSSC camera, aiming at ultra-fast imaging of soft X-rays at the European XFEL. The calibration of the non-linear DEPFET-based readout is the key to reach simultaneously both single-photon resolution and high dynamic range but it is also the major challenge.

The presentation will discuss the main calibration issues and the chosen techniques and will present the results of a thorough experimental qualification of the performance of first DEPFET ladder (512 x 128). It will focus on gain calibration, on the spectroscopic performances, on the measurement and parametrization of the non-linear response and on the impact of high-intensity effects. Correction techniques to mitigate the impact of ADC non-linearities has also been tested. The results show the achievement of noise levels below 10 electrons rms and an input range of several MeV per pixel per pulse, matching the goal of single-photon imaging down to the lowest photon energy foreseen at the European XFEL (0.25 keV) and frame frequency up to 4.5 MHz.

Collaboration

Role of Submitter

I am the presenter

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