

University of Pavia

**Ph.D. School in Electronics, Computer Science and Electrical Engineering
Ph.D. School in Microelectronics**

The DSSC soft X-ray Camera System with Mega- Frame Readout Capability for the European XFEL

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December 16th 2021/15:10

Zoom platform

(<https://us02web.zoom.us/j/85198623155?pwd=emxKc2s0WmtqbU92dmJyNTUxTUx5QT09>)

Abstract: The DSSC camera was developed for photon science applications in the energy range between 0.25 keV and 6 keV at the European XFEL in the Hamburg area in Germany. The first complete, fully tested, 1-Megapixel DSSC camera, is successfully used for experiments at the Spectroscopy and Coherent Scattering (SCS) instrument and the Small Quantum System (SQS) Instrument. The detector system is at the moment the fastest existing 2D camera for soft X-rays.

The camera is based on direct conversion Si-sensors and is composed of 1024 x 1024 pixels. 256 ASICs provide full parallel readout, comprising analog filtering, digitization and in-pixel data storage. In order to cope with the demanding X-ray pulse time structure of the European XFEL, the DSSC provides a peak frame rate of 4.5 MHz. The first megapixel camera is equipped with Miniaturized Silicon Drift Detector (MiniSDD) pixel arrays. The intrinsic response of the pixels and the linear readout limit the dynamic range but allow one to achieve noise values of about 60 electrons r.m.s. at the highest frame rate.

The challenge of providing high-dynamic range ($\sim 10^4$ photons/pixel/pulse) and single photon detection simultaneously requires a non-linear system, which will be obtained with the DEPFET technology foreseen for the advanced version of the camera. This technology provides lower noise and a non-linear response at the sensor level.

Organizer

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The seminar will take place in English
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