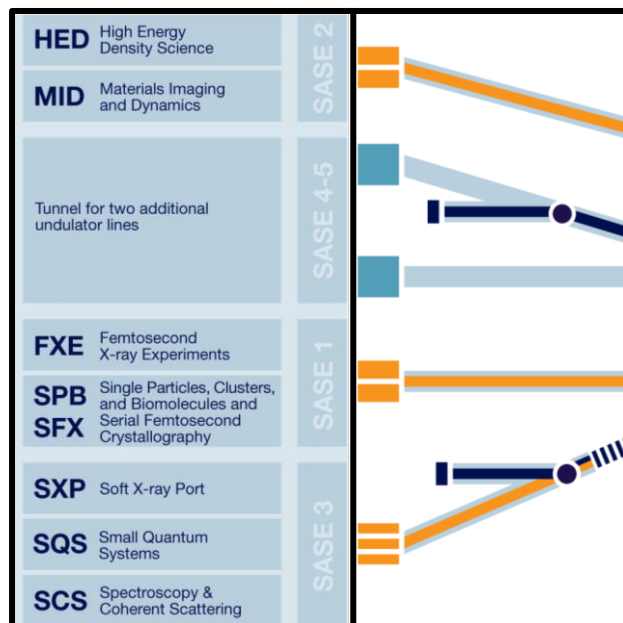


# Calibration of the DEPFET-based DSSC 1-Megapixel Camera

Charles Townsend-Rose, Postdoctoral Scientist

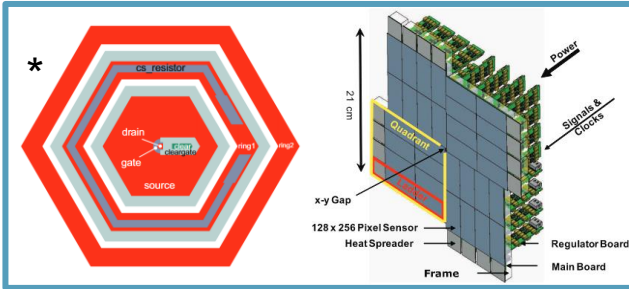
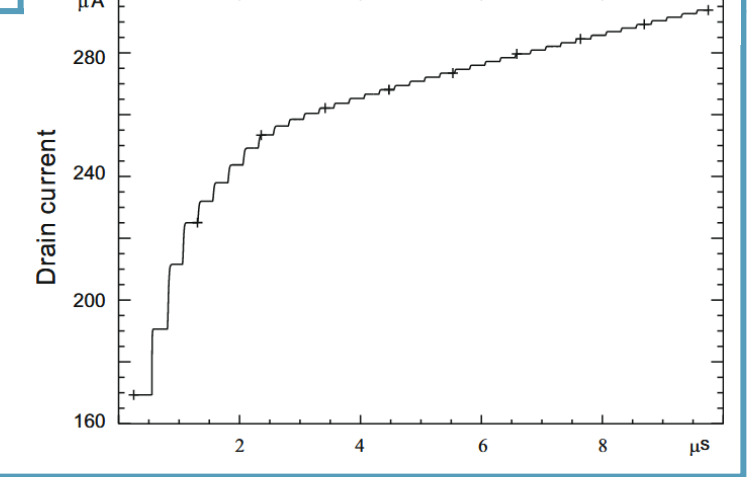
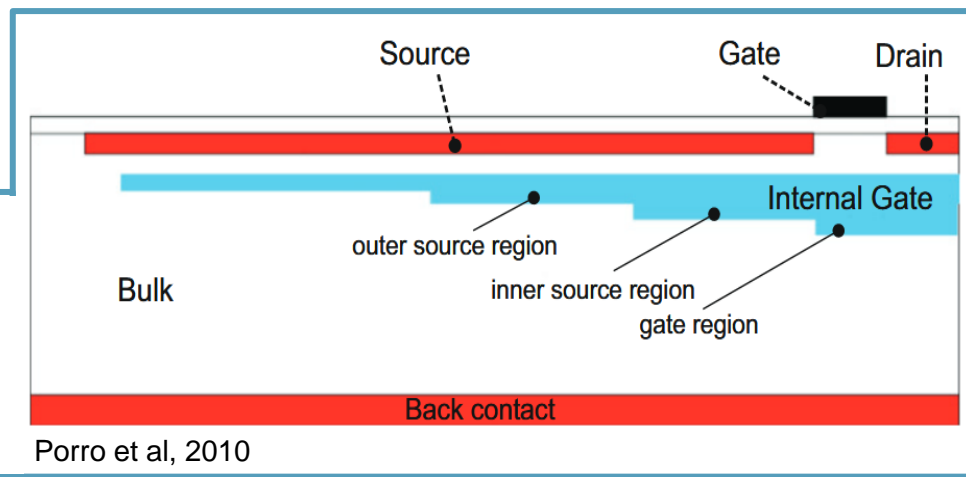
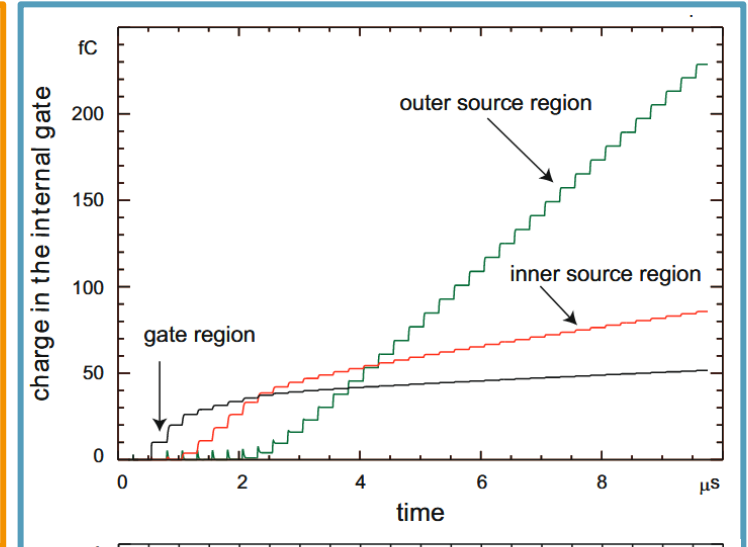
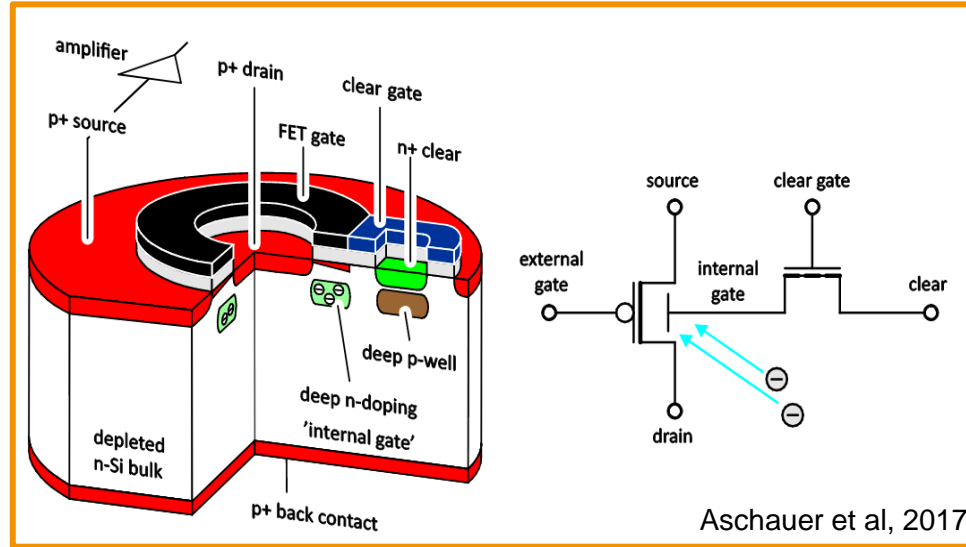
Detector Group, European XFEL

Soft X-ray Detector Workshop, Zurich, 12/01/2026

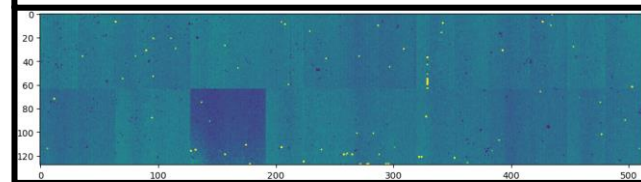
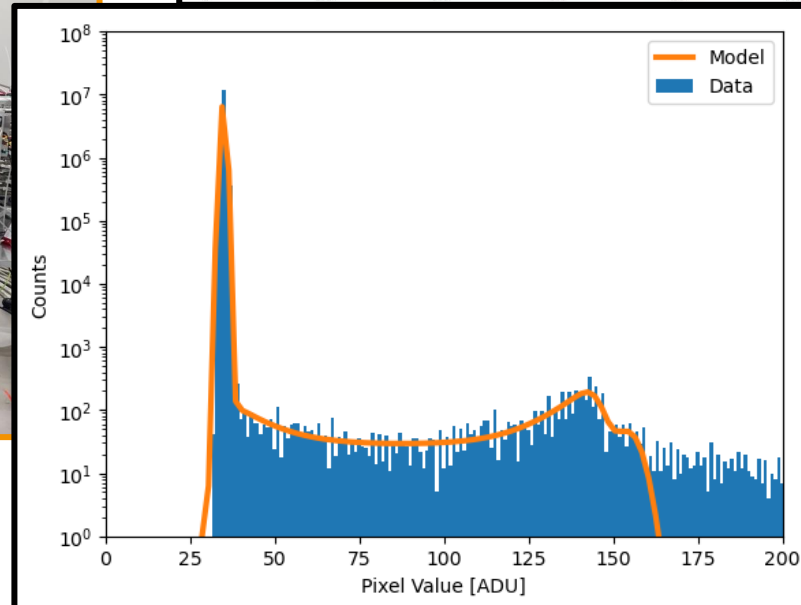
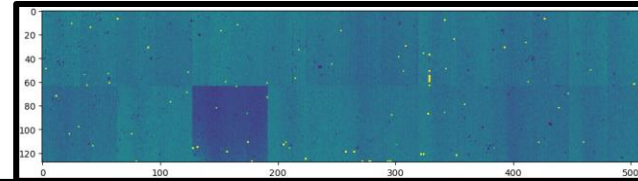
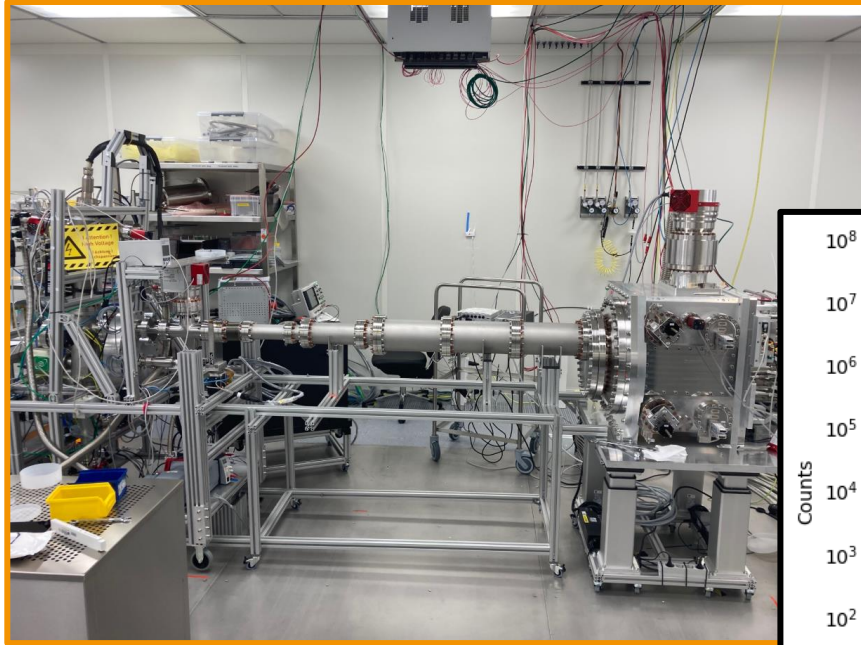


# DSSC: DEPFET Sensor with Signal Compression

Thickness (Si)	725 $\mu\text{m}$
Pixel Array	1024 x 1024
Pixel Pitch	219 $\mu\text{m}^*$
Readout Rate	Up to 4.5 MHz
Sensitivity	0.25 – 6 keV
Noise	Low
Dynamic Range	$\sim 10^4$

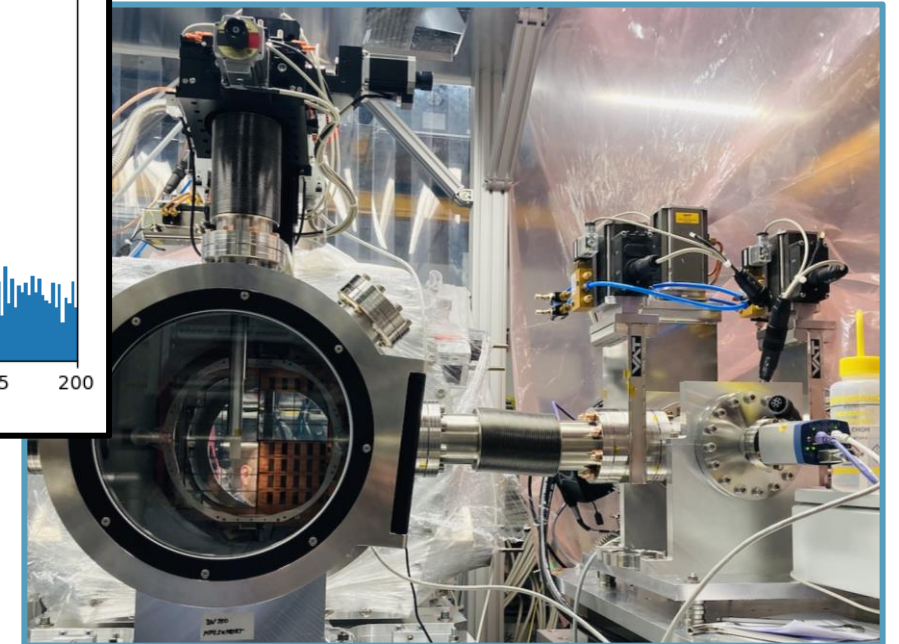


# DSSC Calibration Methods



## SCS/SQS

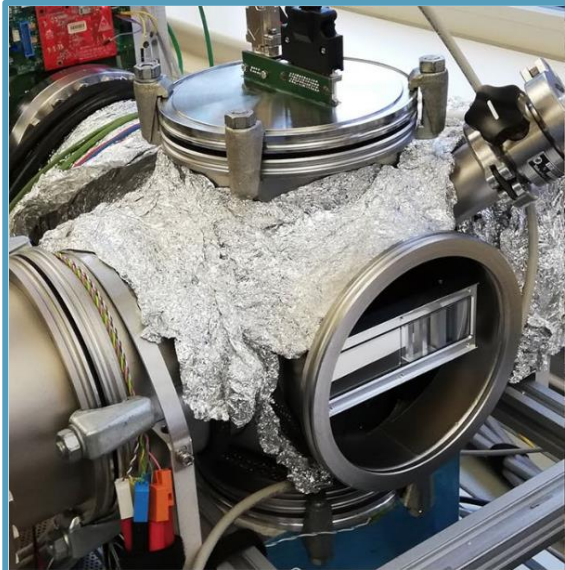
- XFEL
- Target X-ray fluorescence
- Monochromatic
- High intensity



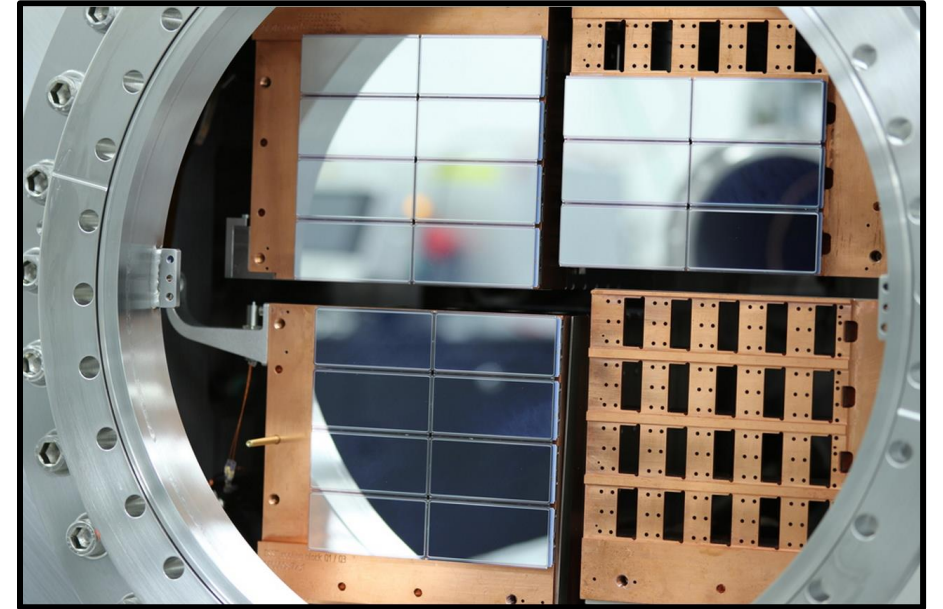
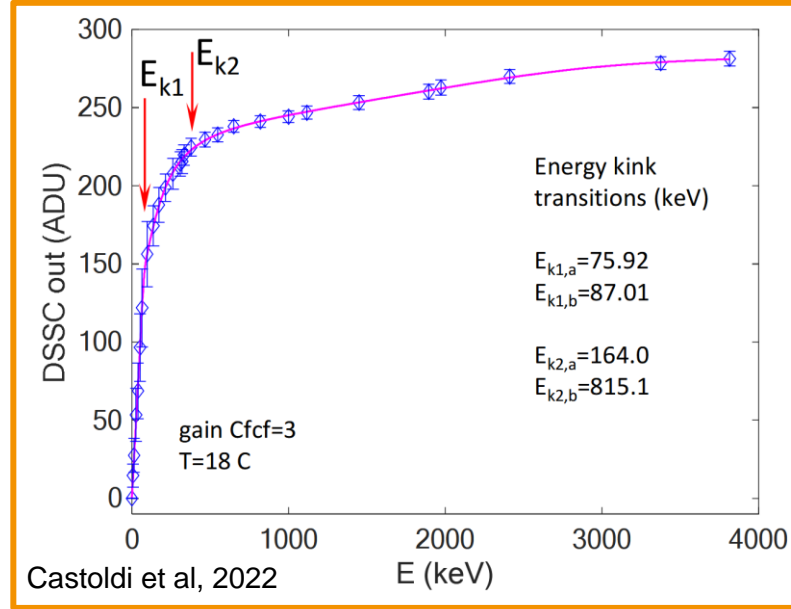
## PulXar

- Pulsed electron gun
- Target X-ray fluorescence
- Bremsstrahlung filter
- Mimics XFEL beamline

# DEPFET-based DSSC Results and Outlook



Maffessanti et al, 2023



Frame rate (MHz)	t <sub>int</sub> (ns)	Filter C <sub>int</sub> (pF)	ADC coarse gain	Gain (ADU/keV) (%)	ENC (e <sup>-</sup> rms)	Dyn. range (ke <sup>-</sup> )
4.5	30	1	1×	3.12 ± 3.65	25.5 ± 5.3	26
2.25	50*	1	1×	5.05 ± 2.2	18.5 ± 2.7	19
		2.5	1×	2.2 ± 4.4	26.6 ± 6.4	489
1.125	300	3.4	1×	1.63 ± 5.3	34.4 ± 9.5	1345
		1	2×	26.8 ± 2.5	9.8 ± 1.4	5
		1	1×	13.4 ± 2.2	10.5 ± 2.1	7
		13.8	1×	2.5 ± 5.5	20.14 ± 5.6	165

