

RIXSCam, a sub-pixel high resolution camera for RIXS applications”

Andrew Holland¹, Karen Holland¹, Bernd Schmitt², Thorsten Schmitt², David Hall³, Matt Soman³

¹ XCAM Ltd, 2 Stone Circle Road, Round Spinney, Northampton, UK, NN3 7RF

² PSI, Switzerland

³ Centre for Electronic Imaging, Open University, Milton Keynes, UK, MK7 6AA

We describe a new ultra-high resolution X-ray photon counting camera system for RIXS spectrometers using a combination of efficient back-illuminated CCD detectors utilising photon event centroiding to achieve sub-pixel spatial resolution. Operating in the energy range 0.1-3 keV, we use back-illuminated CCDs which spread the charge from single soft X-ray photons over several pixels, and an electron multiplying CCD (EM CCD) to produce a sub-electron effective read noise to boost the signal-to-noise. In this way we can clearly resolve the charge cloud signals from photons of energy down to 100 eV, and sub-pixel spatial resolution demonstrated, with a FWHM resolution of 2 microns at 1 keV. The implementation of these new CCDs in a new camera system for RIXS applications is described where 3 CCDs of area 30x30mm² are arranged in a configurable geometry best suited to the RIXS spectrometer. This work is being conducted under an Industrial-Academic collaboration between XCAM, PSI and the OU.