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# Skipper-CCD for quantum microscopy: status and plans

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Skipper-CCD is able to measure the charge in each pixel, repeatedly, in a non-destructive way. As a result, the readout noise can be reduced as much as desired [Tiffenberg et al, 2017]. It allows the precise counting of the number of electrons in each pixel ranging from empty pixel to more than 1900 electrons [Rodrigues et al. 2021]. In addition, they account for very high quantum efficiency (above 90% in the visible range), extremely low dark current (less than 1 electron per pixel per day), and high resolution (pixel size of 15 microns by 15 microns). There are many promising applications of this sensor on Quantum Imaging. In particular, they can provide the same resolution and Noise Reduction Factor in Quantum Microscopy using a factor of hundreds of fewer photons per pixel than the current best achievement in this field [Samantaray et al, 2017]. The same advantage can be expressed as an order of magnitude better resolution at the same number of photons per pixel. This presents a valuable impact of the Quantum Microscopy applications in biology and chemistry when avoiding damaging the sample is required [Taylor et al, 2012]. During this talk, we will present the status and plans for the implementation of Skipper-CCD in this field.

Tiffenberg et al. Single-Electron and Single-Photon Sensitivity with a Silicon Skipper CCD. Phys. Rev. Lett.,119,13,131802,2017,10.1103/Phy

Rodrigues et al. Absolute measurement of the Fano factor using a Skipper-CCD. arXiv:2004.11499v3

Samantaray, N., Ruo-Berchera, I., Meda, A. et al. Realization of the first sub-shot-noise wide-field microscope. Light Sci Appl 6, e17005 (2017). https://doi.org/10.1038/lsa.2017.5

Taylor, M., Janousek, J., Daria, V. et al. Biological measurement beyond the quantum limit. Nature Photon 7, 229–233 (2013). https://doi.org/10.1038/nphoton.2012.346

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