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ORAL ABSTRACT PRESENTATIONS

SESSION TITLE: NEW METHODS OF SAMPLE PREPARATION AND DATA PROCESSING FOR CRYO-ELECTRON MICROSCOPY

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Abstract OR-16: High Resolution Cryo-Electron Microscopy and New Direct Electron Detector from Gatan - K3

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Background: Much of the success of modern cryo-Electron microscopy is the result of advances in electron detector, specifically the advent of direct electron detectors [Kuhlbrandt, 2014, Biochemistry]. Of particular utility has been the Gatan K2 camera that was the first camera to provide single electron detection at practical dose rates, resulting in dramatic improvements in DQE and reduction in noise. The K2 also introduced the concept of super-resolution where the electrons can be registered to sub-pixel resolution. Despite the very high internal readout rate of the K2 camera (400 frames/sec), electron coincidence loss reduces DQE at doses above 3-5 e-/pixel/second, requiring prolonged exposures [Li, 2013, J Struct Biol]. The high frame rate does not only increase the DQE, but also allows to correct for beam-induced sample motion by making an alignment of the individual frames before averaging [Li, 2013, Nat Methods], [Zheng, 2017, Nat Methods].

Results: Here at UCSF Mission Bay, we have the opportunity to make some tests on a prototype of the K3, the next generation CMOS camera from Gatan. This camera increases the pixel count from 14Mpixels to 24 megapixels (5,760×4,092), resulting in a significantly increased field of view (1.6 X). Moreover, it also has a much higher internal readout rate, reducing both coincidence losses and exposure. Together, these promise to substantially improve data collection throughput. The performance and our initial experiences with this new camera will be described during the presentation.

Key Words: cryo-electron microscopy (cryo-EM) • CMOS detectors • high resolution

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