Data collection and processing with a direct electron detector
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Microcrystal electron diffraction (MicroED) permits useful diffraction data collection from nanosized
crystals. MicroED has been successful where other techniques are not applicable, in some cases yielding
structures to sub-atomic resolution by ab initio methods. Usually, MicroED involves a continuously
rotating sample probed by high-energy electrons while the diffraction pattern is read out on a fast,
shutterless camera. Even though electrons interact favorably with matter, small crystals of large
proteins require an efficient electron detector to be accurately recorded. This is particularly true for
radiation-sensitive specimen, for which signal strength cannot be enhanced by increasing the exposure
without damaging the sample. This presentation explores the link between crystal size, radiation
damage, and camera performance. Using the Falcon III direct electron detector, which was designed for
imaging in electron cryo-microscopy (cryo-EM), it is shown that data can be collected faster and with
significantly lower exposure than previously reported.