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# Imaging using Ptychographic iterative algorithms

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Ptychography is a lensless imaging technique. Light that is transmitted through a sample is measured. Through iterative algorithms this transmitted light's relative amplitude and phase is reconstructed. This information can be used to create an image of the sample. In ptychography, sections of the sample are illuminated individually and a diffraction pattern of each section is detected in the far field. In doing so, the intensity information of the sample is measured, but the phase information is lost. By ensuring significant spatial overlap between neighbouring illuminated sections of the sample, the reconstruction converges to the corresponding relative phase of the sample. A ptychographic iterative engine (PIE) algorithm is employed to reconstruct the amplitude and phase of the light transmitted by the sample from the measured diffraction patterns. The PIE algorithms that are discussed here were simulated, and then implemented to reconstruct real samples. Preliminary representative reconstruction results will be shown. Factors that limit the imaging resolution include the quality of the angular spectrum that is captured by the detector. This label free imaging technique has the advantage of imaging deep within the sample, because the optical setup is not limited by a lens's working distance. Also, the reconstruction of the phase allows for phase contrast imaging of transparent biological samples.

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