Sparsity-based single-shot sub-wavelength coherent diffractive imaging

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New abstract

Coherent Diffractive Imaging (CDI) is an algorithmic imaging technique where intricate features are reconstructed from measurements of the freely-diffracting intensity pattern. An important goal of such lensless-imaging methods is to study the structure of molecules that cannot be crystallized. Ideally, one would want to perform CDI at the highest possible spatial resolution and in a single-shot measurement - such that CDI could be applied to imaging at ultrafast rates. Undoubtedly, such capabilities would give rise to unprecedented possibilities, for example, observing molecules while they dissociate or undergo chemical reactions. However, the resolution of current CDI techniques is limited by the diffraction limit, and therefore cannot resolve features smaller than one half the wavelength of the illuminating light, which is considered a fundamental limit in diffractive imaging. Here, we