

Improving the transmission electron microscope capabilities through holography and phase manipulation

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Ordinary electron beams in a transmission electron microscope are characterised by an even intensity and a phase that is as flat as possible. Phase manipulation techniques allow for the tailoring of the amplitude and phase of the wavefront, improving the beam quality and generating beams with peculiar characteristics that can be used as probes. The recent improvements in nanofabrication make it possible to fabricate nanostructured phase masks that locally shift the phase of the beam wavefront, generating beams with arbitrary intensity and phase. Applications in aberration correction, phase retrieval and beams carrying orbital angular momentum will be presented.