

FIG. 1. Vortex electrons break the centrosymmetry imposed by Friedel's law showing the threefold symmetry of the far field pattern of a triangular aperture when illuminating the aperture with either a left or right handed vortex (left or right figure). The central figure shows illumination with a conventional non-vortex beam leading to six-fold symmetry in the diffraction pattern (center). Bottom figures are an experimental realisation of this effect.

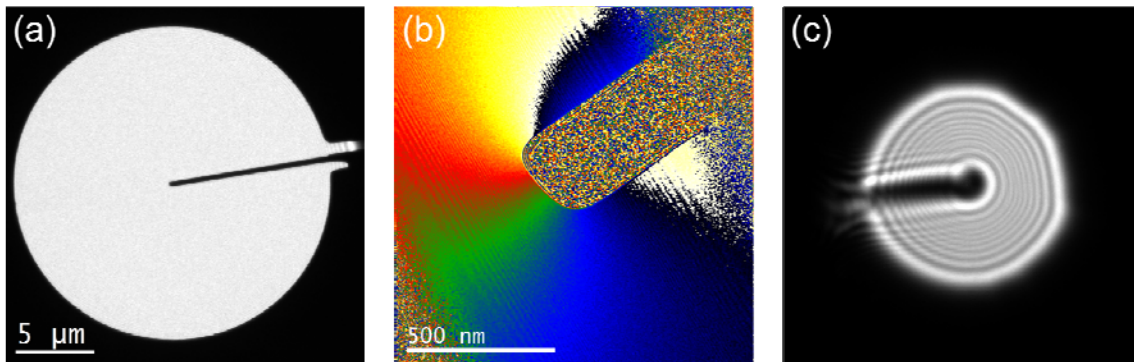


FIG. 2. (a) Magnetic needle placed in the middle of an aperture. (b) Experimental phase shift of $\sim 1.2 \times 2\pi$ measured at the tip of the needle using holography in field free conditions (Lorentz mode). (c) Visualisation of the needle in the far field. A clear destructive interference pattern typical of vortex beam appears in the middle of the pattern.