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**Inducing vortices in a Bose-Einstein condensate using light beams with orbital angular momentum** WASEEM BAKR, JONATHON GILLEN, AMY PENG, JOHANNES BRACHMANN, MARKUS GREINER, Harvard University — We excite vortex states in a Rb-87 BEC using coherent transfer of angular momentum from light to atoms. The transfer is achieved by a Raman transition between the two hyperfine ground states using a Gaussian beam and a holographically generated vortex beam. The arbitrary phase pattern imprinted onto the beam by the hologram is used to produce vortices with arbitrary charge and orientation. In particular, we demonstrate the controlled generation of a vortex anti-vortex pair and use atom interferometry to verify the creation of the expected phase pattern in the condensate.

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