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A Bose-Einstein condensate in holographically-generated optical traps

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We simulate the preparation of a superposition of vortex states in a Bose-Einstein condensate trapped in a ring geometry. It has been proposed that a vortex-antivortex superposition can be used as an inertial sensor, e.g. to measure rotations, or as a magnetic field sensors [1,2]. In both cases, the external influence causes a precession of the BEC standing wave, which can be measured experimentally. In this talk I will show how computer-generated holography [3] can be used for the efficient preparation of these states, and I will demonstrate their stability by simulating their subsequent evolution.

[1] S. Thanvanthri et_al., Journal of Modern Optics 59,1180(2012).

[2] G Pelegrí et_al., New J.Phys. 20,103001(2018).

[3] D. Bowman et_al., Opt.Express 25,11692(2017).

Primary author(s) : Dr. CASSETTARI, Donatella (University of St Andrews)

Presenter(s) : Dr. CASSETTARI, Donatella (University of St Andrews)

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