

Abstract Submitted  
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**Controlling vortex rings in Bose-Einstein condensates using artificial gauge fields**<sup>1</sup> JAMES SCHLOSS, RASHI SACHDEVA, LEE JAMES O'RIORDAN, THOMAS BUSCH, Okinawa Inst of Sci & Tech — The exponentially decaying evanescent fields near the boundary of dielectric systems can be used to create artificial gauge fields for the generation of vortices in Bose-Einstein condensate (BEC) systems. Here we study the artificial gauge field created by the evanescent field outside of an optical nanofiber from the fundamental HE<sub>11</sub> mode and its application to generating and controlling vortex rings in a toroidal BEC trapped around the nanofiber. This has been done by developing a GPU-based code that solves the Gross-Pitaevskii equation for the BEC system in three dimensions and using it to study ground state vortex ring structures and their time evolution. Since these gauge fields may be controlled in a time-dependent manner, we can use this system to study the dynamics of complex vortex topologies.

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