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Macroscopic quantum tunneling of a single vortex in a rotating Bose-Einstein condensate[1] KINJAL DASBISWAS, ALAN T. DORSEY, Department of Physics, University of Florida — A vortex can be created in a metastable state near the center of a harmonically trapped Bose condensate when it is rotated with suitable velocities. This state has a finite lifetime before which the vortex tunnels outwards to the edge of the trap. We estimate this tunneling rate semi-classically with the vortex treated as a point particle. This is followed by a more exact treatment incorporating the dynamics and mass of the vortex. The calculation is based on a Thomas-Fermi approximation, relevant to the typically large atomic densities used in experiments, but we also analyze the low density limit in a "weakly nonlinear" perturbative framework. We discuss the feasibility of detecting this effect with currently achievable experiments.

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