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Vortex nucleation in a Bose-Einstein condensate circulating in an anharmonic trapping potential SEJI KANG, JAE-YOON CHOI, SANG WON SEO, YONG-IL SHIN[1], Seoul Natl Univ, SEOUL NATL UNIV TEAM[2] — When a Bose-Einstein condensate moves in an anharmonic trapping potential, the center-of-mass motion of the condensate can affect its internal superfluid dynamics in contrast to the case of a harmonic potential. We study condensate dynamics in an externally driven anharmonic potential and observe that vortices are nucleated when the condensate circulates in the anharmonic trap. In our experiment, the anharmonic trapping potential is provided by a magnetic quadrupole field and an external driving force is applied with modulating external bias fields. Under a resonant circular drive, the trapped condensate shape rotates in phase with the external circulation, leading to vortex nucleation via surface mode excitations. We investigate the vortex nucleation rate for various polarizations of the external driving, where, in particular, we confirm the rotational symmetry breaking due to the chiral spin texture imposed by the magnetic quadrupole field [1].

[1] J. Choi, et al., Phys. Rev. Lett. 111, 245301 (2013)

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