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Berry Phase Effect on Semiclassical Dynamics of Bogoliubov Quasiparticles[1] CHUANWEI ZHANG, Department of Physics & Center for Nonlinear Dynamics, The University of Texas at Austin, ARTEM DUDAREV, Max-Planck-Institut für Physik Komplexer Systeme, Dresden, Germany, QIAN NIU, Department of Physics, The University of Texas at Austin — We develop a semiclassical theory for Bogoliubov quasiparticles in a superfluid by following the center of mass motion of a quasiparticle wavepacket. Berry phase arises when the underlying condensate moves, invalidating the usual canonical relation between the mechanical momentum and position variables. The equations of motion become non-canonical, and the quantization rule and the density of states are also modified. We study quasiparticles in a condensate with a vortex to show explicitly the Berry phase effects and their experimental observation.

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