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Dynamical detection of a topological phase transition in one-dimensional spin-orbit-coupled Fermi gases[1] F. SETIAWAN, Condensed Matter Theory Center and Joint Quantum Institute, University of Maryland, College Park, KRISHNENDU SENGUPTA, Indian Association for the Cultivation of Science, Kolkata, India, IAN SPIELMAN, Joint Quantum Institute, National Institute of Standards and Technology, and University of Maryland, College Park, JAY SAU, Condensed Matter Theory Center and Joint Quantum Institute, University of Maryland, College Park — We theoretically study the dynamics of topological phase transition in one-dimensional (1D) spin-orbit coupled (SOC) Fermi gases with attractive interaction as a means of detecting the phase transition. The transition from conventional (trivial) superfluid to topological superfluid phase happens as the intensity of the Raman lasers (Zeeman field) is ramped above the critical value. To minimize effect of heating, we propose to ramp from a conventional superfluid phase through the topological phase transition and back. We calculate the momentum distribution of the atoms after the ramp by solving the time-dependent Bogoliubov-de Gennes (BdG) equations self-consistently with the initial state of the Fermi gas being the thermal state. We show that the phase transition can be detected by measuring the scaling of the momentum distribution with the ramp rate.

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