Abstract Submitted
for the DAMOP13 Meeting of
The American Physical Society

A test of Kibble-Zurek theory using spinor Bose-Einstein condensates ANSHUMAN VINIT, CARLO SAMSON, CHANDRA RAMAN, Georgia Institute of Technology, CHANDRA RAMAN TEAM — We investigate the predictions of Kibble-Zurek phenomena in the vicinity of a quantum phase transition in the sodium spinor Bose-Einstein condensates. Close to a phase transition, the relaxation time of a system diverges and the system ceases to be adiabatic. Kibble-Zurek phenomena exploits this critical slowing down of the system to predict the rate of formation of defects, as they form when a freeze-out occurs during a linear quench. This freeze-out is predicted to take place when relaxation time becomes comparable to the time left for the system to reach the phase transition.In our earlier work we have observed a quantum phase transition in a spinor Bose-Einstein condensate.[1] We test the predictions of the Kibble-Zurek theory by performing linear quenches at varying rates across the phase transition and quantifying the number of defects seeded in the process. This can also be used to predict the critical exponents of the phase transition.

[1]E. M. Bookjans, A. Vinit, and C. Raman, Phys. Rev. Lett. 107, 195306 (2011).

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Date submitted: 29 Jan 2013 Electronic form version 1.4