Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Dynamics of a finite-rate quantum quench in an ultra-cold atomic BCS superfluid[1] CHIH-CHUN CHIEN, BOGDAN DAMSKI, Los Alamos National Laboratory — We study dynamics of an ultra-cold atomic BCS superfluid driven towards the BCS superfluid-Fermi liquid quantum critical point by a gradual decrease of the pairing interaction. We analyze how the BCS superfluid falls out of equilibrium and show that the non-equilibrium gap and Cooper pair size reflect critical properties of the transition. We observe three stages of evolution: adiabatic where the Cooper pair size is inversely proportional to the equilibrium gap, weakly non-equilibrium where it is inversely proportional to the non-equilibrium gap, and strongly non-equilibrium where it decouples from both equilibrium and non-equilibrium gap. These phenomena should stimulate future experimental characterization of non-equilibrium ultra-cold atomic BCS superfluids.

[1]This work is supported by U.S. Department of Energy through the LANL/LDRD Program.

Chih-Chun Chien
Los Alamos National Laboratory

Date submitted: 16 Nov 2010 Electronic form version 1.4