Abstract Submitted
for the DAMOP14 Meeting of
The American Physical Society

The Transience of Defects in an Equilibrating Unitary Fermi Gas
PETER SCHERPELZ, KARMELA PADAVIC, ADAM RANCON, University of Chicago, ANDREAS GLATZ, IGOR ARANSON, Argonne National Laboratory, K. LEVIN, University of Chicago — We present numerical simulations of phase imprinting experiments in trapped Fermi gases. Here we investigate the behavior of the defects formed as the fluid returns to equilibrium, and relate this to the recent observation of oscillating defects (claimed to be solitonic) in a Fermi gas [1]. We consider dynamics associated with the time-dependent Ginzburg-Landau equation, which contains dissipation and stochastic noise [2]. All defects we find are surprisingly short-lived, and we explain the origin of their transience. Solitons and vortex rings generally rapidly decay to more stable precessing line vortices. We speculate that these line depletions may be relevant to experimental observations [1]. We address how the trap, system size, and starting conditions affect the type of defect, its lifetime, and its oscillation period.

[1] T. Yefsah et al., Nature 499 426 (2013).
[2] A. Glatz, H. Roberts, I. Aranson, and K. Levin, PRB 84 180501 (2011).

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Date submitted: 30 Jan 2014 Electronic form version 1.4