Abstract Submitted
for the DAMOP17 Meeting of
The American Physical Society

Collective modes of a soliton train in a Fermi superfluid[1] SHOVAN DUTTA[2], ERICH MUELLER, Laboratory of Atomic and Solid State Physics, Cornell University — We characterize the collective modes of a soliton train in a quasi-one-dimensional Fermi superfluid, using a mean-field formalism. In addition to the expected Goldstone and Higgs modes, we find novel long-lived gapped modes associated with oscillations of the soliton cores. The soliton train has an instability that depends strongly on the interaction strength and the spacing of solitons. It can be stabilized by filling each soliton with an unpaired fermion, thus forming a commensurate Fulde-Ferrell-Larkin-Ovchinnikov phase. We find such a state is always dynamically stable, which paves the way for realizing them in experiments via phase imprinting.

[1]NSF Grant PHY-1508300, ARO-MURI Non-equilibrium Many-body Dynamics Grant W9111NF-14-1-0003

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Date submitted: 27 Jan 2017 Electronic form version 1.4