Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Chiral Phases of Superfluid ^{3}He in an Anisotropic Medium[1]
JAMES SAULS, Northwestern University — I report theoretical results for the phases of superfluid ^{3}He infused into homogeneous uniaxial aerogel. Ginzburg-Landau (GL) theory for a class of equal-spin-pairing (ESP) states in a medium with uniaxial anisotropy is developed and used to analyze recent experiments on uniaxially strained aerogels. For ^{3}He in an axially "stretched" aerogel GL theory predicts a transition from normal liquid into a *chiral* ABM phase in which the chirality axis is aligned along the strain axis. This state is protected from random fluctuations in the anisotropy direction, has a positive NMR shift, a sharp NMR resonance line and is in quantitative agreement with NMR in the high-temperature ESP-1 phase of superfluid ^{3}He in axially stretched aerogel. A second transition into a bi-axial phase is predicted to onset at a slightly lower temperature. This phase is an ESP state, breaks time-reversal symmetry, and is defined by an order parameter that spontaneously breaks axial rotation symmetry. The bi-axial phase has a continuous degeneracy associated with broken axial symmetry. Theoretical predictions for the NMR frequency shifts provide an identification of the ESP-2 phase as the bi-axial state, partially *disordered* by random anisotropy (Larkin-Imry-Ma effect).

[1]Supported by National Science Foundation Grant DMR-1106315.

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Date submitted: 08 Nov 2012 Electronic form version 1.4