Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Fermionic spectrum of superfluid phases of ^{3}He under strong confinement[1] J.A. SAULS, HAO WU, Northwestern Univ — For superfluid ^{3}He in confined geometries and films, the interplay between Fermions confined on opposing surfaces will in general modify the surface spectrum. We calculate the surface spectrum of a polar phase and the B phase confined between specular reflecting on both surfaces. We show that for polar phase the surface bound states will develop a band structure for any in plane momentum with a sub-gap separating the bound states and continuum states. The bandwidth is determined by the thickness of film. However for B-phase, the interplay between surface states does not change the energy spectrum, but only modulates their spectral weight. The wave function of the surface bound states at both surfaces are calculated. It is shown that the bound state energy disperses linearly with parallel momentum $p_{||}$ and even though the spatial part of the wave functions overlap, the Nambu spinors for surface states are orthogonal to each other. This leads to robustness of surface spectrum in highly confined ^{3}He-B. We reported that the Nambu spinor at $z = 0$ describes a right-handed helical state, while the Nambu spinor at $z = D$ describes a left-handed helical state. They give rise to a spin currents that are opposite on the opposing surfaces.

[1]Supported by NSF Grant DMR-1106315.

James Sauls
Northwestern Univ

Date submitted: 15 Nov 2013 Electronic form version 1.4