Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

The Momentum Distribution of Liquid ^{3}He, Revisited[1] PAUL SOKOL, MATTHEW BRYAN, Indiana Univ - Bloomington, TIMOTHY PRISK, Oak Ridge National Lab — Liquid 3He is a system of fundamental importance to condensed matter physics because it is a prototypical example of a strongly interacting fermion system whose interactions are well known. Quantum Monte Carlo calculations predict that the atomic momentum distribution of liquid ^{3}He contains a Fermi surface discontinuity and an average atomic kinetic energy in the range 12-13 K at saturated vapor pressure. A number of high-resolution neutron Compton scattering studies of liquid ^{3}3He have been described in the literature, with experimenters observing no Fermi surface discontinuity and obtaining kinetic energies in the range of 8-10 K. In this presentation, we reconsider measurements of the momentum distribution of liquid 3He taken at 500 mK under 0, 10, 15 bar of pressure [R.M. Dimeo et al Physica B 241-243, 952 (1998)]. We demonstrate that there is complete agreement between the experimental data and quantum Monte Carlo calculations when instrumental resolution and final state effect corrections are taken into account. We also consider the prospects for a direct observation of the Fermi surface discontinuity in liquid 3He using neutron Compton scattering.

[1]This research was supported by NSF award DGE-1069091.

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Date submitted: 06 Nov 2015 Electronic form version 1.4