Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Measurements of Longitudinal and Transverse NMR Frequencies in Superfluid ^{3}He using dc SQUID Detectors[1] YULIANG DU, H.M. BOZLER, C.M. GOULD, University of Southern California — The most important tools in the initial identification of the order parameters of the superfluid phases of ^{3}He in bulk were longitudinal and transverse NMR because the detailed comparison of these frequencies and their magnetic field dependences strongly differentiated between alternative models. In contrast, for superfluid ^{3}He confined within aerogel, longitudinal resonance has not been measured to date, having only been inferred from transverse measurements and the simple sum of squares relation known to hold for the axial state in bulk. This relationship has not been confirmed for the aerogel-confined phase, and there are theoretical suggestions that it may not be valid. We have begun an experiment to directly compare longitudinal and transverse resonance frequencies in aerogel-confined superfluid ^{3}He using some of the same dc SQUID NMR techniques we have developed over the last 20 years in our lab. In initial experiments to prove the technique, we are making optimal use of the broadband nature of the dc SQUID detector and have measured the superfluid's longitudinal response to a sudden field step.

[1]Supported by the National Science Foundation through grant DMR0307382.

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Date submitted: 29 Nov 2005 Electronic form version 1.4