Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Mass Injection and Flow in Solid ^{4}He MICHAEL RAY, ROBERT HALLOCK, University of Massachusetts — Our experiments, which utilize a cell filled with solid helium that is pierced by two superfluid-filled Vycor electrodes, have been interpreted to show evidence for the flow of mass though solid ^{4}He [1]. When flow is observed, there is also a change in the pressure recorded on capacitive pressure gauges directly in contact with the solid at each end of the cell. When no evidence for flow is seen we typically see no change in the pressure of the solid. Both features are explained by a theory of the isochoric compressibility of solid ^{4}He [2]. The theory, supported by simulations, proposes that flow through the system can be achieved by the "super-climb" of edge dislocations, fed by superflow along dislocation cores, and this can only take place in a finite temperature range low enough so that the dislocation cores are superfluid, but high enough so that the dislocations are rough. We will report continuing experiments to investigate these phenomena.
Our experiments are supported by the NSF via DMR 08-55954.

[1] M.W. Ray and R.B. Hallock, Phys. Rev. Lett. **100**, 235301 (2008); Phys. Rev. B **79**, 224302, (2009).
[2] Ş G. Söyler *et al.* Phys. Rev. Lett. **103**, 175301 (2009).

Michael Ray
University of Massachusetts

Date submitted: 20 Nov 2009 Electronic form version 1.4