Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Mass flow in bulk solid ^{4}He[1] ZHI GANG CHENG, JOHN BEAMISH, University of Alberta — Experiments with solid ^{4}He and liquid confined in vycor pores have shown an unexpected mass flow in both liquid-solid-liquid and solid-liquid-solid junctions. In both configurations, non-thermally activated flow emerges below 600 mK. The flow rate increases as the temperature decreases, then drops suddenly at a temperature around 100 mK. This drop in flow rate is related to the ^{3}He impurity concentration in the samples and prevents us from studying the flows intrinsic behavior at the lowest temperatures. We have now modified our measurement technique, in which solid helium is compressed at one end of a cell and flow is observed as a pressure response at the opposite end. By removing the vycor from our cell, we have eliminated liquid ^{4}He and the liquid-solid interfaces which complicated the interpretation of earlier experiments. We find that similar mass flow occurs with only bulk solid ^{4}He present. When we reduced the ^{3}He concentration to the level of a few parts per trillion, we were able to measure the intrinsic flow rate down to lower temperatures, with no evidence of a drop in flow down to at least 25 mK.

[1]This work was supported by a grant from NSERC Canada

John Beamish
University of Alberta

Date submitted: 06 Nov 2015 Electronic form version 1.4