Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Shear measurements of bulk solid ^{4}He[1] JAMES DAY, JOHN BEAMISH, Department of Physics, University of Alberta — Recent torsional oscillator experiments indicate that the non-classical rotational inertia (NCRI) fraction depends on isotopic purity and on the details of crystal growth and annealing, suggesting that defects may be involved. While solid helium does not flow in response to pressure gradients at low temperatures, plastic deformation of solid helium closer to melting creates defects and pressure gradients which are not easily eliminated by thermal annealing. Similar defects must be created during crystal growth by the blocked capillary method or by large thermal gradients. Given the theoretical arguments against supersolidity in defect-free crystals and the preliminary experimental evidence linking NCRI to annealing, it is important to control and study defects in solid helium more directly. To that effect, we have begun to study the static and low frequency shear deformation of crystals grown by different methods. This is a direct measure of the shear modulus of the crystal and should allow us to separate elastic from inertial effects. We can also compare the elastic to the plastic deformation response by increasing the magnitude of the shear stress applied to the crystal. We will describe our experimental design and present preliminary results.

[1]This work was supported by NSERC

James Day
Department of Physics, University of Alberta

Date submitted: 16 Nov 2006 Electronic form version 1.4