Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Effects of ^{3}He Impurities on the Non-Classical Rotation Inertia of Solid ^{4}He as Measured by Compound Torsion Pendulum[1] DAVID RUFFNER, MICHAEL KEIDERLING, PATRYK GUMANN, HARRY KOJIMA, Rutgers University — An intriguing observation related to the discovery of non-classical rotational inertia(NCRI) of solid ^{4}He at low temperatures is the extreme sensitivity to ^{3}He concentration(x_3). Both the magnitude and temperature dependence of the NCRI are affected by relatively low x3 introduced into solid ^{4}He samples.[1] We are exploring the ^{3}He impurity effect using our compound torsional pendulum which allows probing the NCRI of the identical solid ^{4}He sample at two different frequencies ($\sim$493 and $\sim$1165 Hz). The NCRI fractions were derived from the measured shifts in the oscillator frequency of the two modes as functions of temperature. The NCRI fraction derived from the higher frequency mode is greater than that derived from the lower frequency mode at all temperatures. If the NCRI fractions of both modes are normalized at their maximums, the temperatures at which they decrease to 50 % of the maximum are greater in the higher mode by $\sim$9, 31 and 56 mK when the nominal x_3 added is 0.3, 3 and 10 ppm, respectively. Greater values of x_3 are currently being studied.[1]Kim, et al., Phys. Rev. Lett. **100** 065301(2008).

[1]Supported in part by NSF grant DMR-0704120.

Haruo Kojima
Rutgers University

Date submitted: 01 Dec 2008 Electronic form version 1.4