

Abstract Submitted  
for the MAR10 Meeting of  
The American Physical Society

**Supersolid-like Behavior in Thin Solid  $^4\text{He}$  Films Adsorbed on a Nanoporous Glass**<sup>1</sup> KEIYA SHIRAHAMA, TAKAYUKI KOGURE, RAMA HIGASHINO, HITOMI YOSHIMURA, YOSHIYUKI SHIBAYAMA, Keio University — Two-dimensional  $^4\text{He}$  solid is a prospective system for observing supersolidity. We study thin solid  $^4\text{He}$  films adsorbed on a porous glass with 2.5 nm pore size. Torsional oscillator (TO) measurements are carried out for coverage  $n$  from 6 to 30  $\mu\text{mol}/\text{m}^2$ . Even in the solid films ( $n < 21\mu\text{mol}/\text{m}^2$ ) we have observed an increase in the TO frequency associated with a dissipation peak; i.e. the supersolid - like behavior. The onset temperature of the frequency shift shows an interesting coverage dependence: It is 1 K at 6  $\mu\text{mol}/\text{m}^2$  and approaches 0 K near the critical coverage  $n_c = 21\mu\text{mol}/\text{m}^2$ , above which liquid film superfluidity is observed. The overall behaviors might be interpreted as a quantum critical phenomenon around  $n_c$ . Further studies including oscillation velocity dependence and measurements for solid  $^3\text{He}$  films are underway.

<sup>1</sup>Work supported by Grant-in-Aid for Scientific Research (S) and in Priority Area, MEXT, Japan.

Keiya Shirahama  
Keio University

Date submitted: 21 Dec 2009

Electronic form version 1.4