Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Excitations of Amorphous Solid Helium JACQUES BOSSY, Institut Néel, CNRS-UJF, BP 166, 38042 Grenoble Cedex 9, France, JACQUES OLLIVIER, Institut Laue-Langevin, BP 156, 38042 Grenoble, France, HELMUT SCHOBER, Institut Laue-Langevin, BP 156, 38042 Grenoble, France, Universite Joseph Fourier, UFR de Physique, F38041 Grenoble Cedex 9, France, HENRY R. GLYDE, Department of Physics and Astronomy, University of Delaware — We present neutron scattering measurements of the dynamic structure factor, $S(Q,\omega)$, of amorphous solid helium confined in 47 Å pore diameter MCM-41 at pressure 48.6 bar. At low temperature, $T = 0.05$ K, we observe $S(Q,\omega)$ of the confined quantum amorphous solid plus the bulk polycrystalline solid between the MCM-41 powder grains. No liquid-like phonon-roton modes, other sharply defined modes at low energy ($\omega < 1.0$ meV) or modes unique to a quantum amorphous solid that might suggest superflow are observed. Rather the $S(Q,\omega)$ of confined amorphous and bulk polycrystalline solid appear to be very similar. At higher temperature ($T > 1$ K), the amorphous solid in the MCM-41 pores melts to a liquid which has a broad $S(Q,\omega)$ peaked near $\omega \simeq 0$ characteristic of normal liquid ^{4}He under pressure. Expressions for the $S(Q,\omega)$ of amorphous and polycrystalline solid helium are presented and compared. In previous measurements of liquid ^{4}He confined in MCM-41 at lower pressure the intensity in the liquid roton mode decreases with increasing pressure until the roton vanishes at the solidification pressure (38 bars), consistent with no roton in the solid observed here

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Date submitted: 04 Dec 2012 Electronic form version 1.4