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Dynamics of one and two dimensional solid ^{4}He adsorbed on nanotubes BJORN FAK, CEA, DRFMC Grenoble, France, SOULEYMANE DIALLO, University of Delaware, MARK ADAMS, Rutherford Appleton Laboratory, UK, OSCAR VILCHES, University of Washington, HELMUT SCHOBER, Institut Laue Langevin, Grenoble, France, HENRY GLYDE, University of Delaware — In a previous experiment[1], we showed that one dimensional (1D) solid helium can be created on the surface of nanotube bundles. Specifically, when ^4He is first adsorbed on nanotubes, it forms a 1D linear solid along the grooves between two nanotubes on the bundle surface with lattice parameter, $a_1 = 3.40 \pm 0.02$ Å. When more helium is added, 2D solid helium covers the whole bundle surface. We have now determined the vibrational dynamics of these 1D and 2D solids, the dynamic structure factor, $S(Q,\omega)$. From the inelastic intensity integrated over all ω we obtain the MS amplitude of vibration along 1D chain $\langle u^2 \rangle = 0.28$ Å^{2}or Lindemann ratio $\gamma = (\langle u^2 \rangle)^{1/2}/a_1 = 0.15$ which is less than the bulk solid value near melting. The vibrational density states (DOS) of the 2D solid shows a gap at $\omega \simeq 0.75$ meV indicating a commensurate solid as found for ^3He and ^4He on graphite surfaces. In contrast the 1D DOS shows little or no gap and the DOS goes uniformly to zero as $\omega \to 0$. [1] Pearce et al. Phys. Rev. Lett. 95, 185302 (2005).

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