Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Excitation of the Shear Horizontal Mode in a Monolayer by Inelastic Helium Atom Scattering L.W. BRUCH[1], Department of Physics, University of Wisconsin-Madison, F.Y. HANSEN, Department of Chemistry, Technical University of Denmark — Inelastic low energy helium atom scattering (HAS) by a physisorbed monolayer is treated in the one-phonon approximation using a time-dependent wave packet formulation. Modes with shear horizontal (SH) polarization are excited near high symmetry azimuths of the monolayer, in agreement with recent experiments. The calculations are for the conditions of HAS experiments for triangular incommensurate monolayer solids of xenon, krypton, and argon adsorbed on the (111) face of platinum, and the results show many of the systematic experimental trends for relative excitation probability of the SH and longitudinal acoustic (LA) phonon branches. Although polarization selection rules appear to preclude the excitation of SH modes, there are large departures from expectations based on analogies to inelastic thermal neutron scattering. The calculations show that the inelastic scattering at beam energies near 8 meV is exceedingly sensitive to small misalignment between the scattering plane and the high symmetry directions of the monolayer solid.

[1]Work supported in part by NSF DMR-0104300

Ludwig Bruch
University of Wisconsin-Madison

Date submitted: 24 Nov 2004 Electronic form version 1.4