ABSTRACT

Recent torsional oscillator measurements of solid helium confined in porous media [1,2] and in bulk form [3] found evidence of non-classical rotational inertia indicating superfluid behavior below 0.2K. Measurements of solid samples at different pressure (and hence different density) allow us to map out the boundary of this supersolid phase. The low temperature supersolid fraction shows a non-monotonic dependence on pressure. It first increases with pressure reaching a maximum of 1.5% near 55 bars and then decreases with further increase with pressure. We have also obtained preliminary results indicating solid molecular hydrogen also exhibit a similar transition, at a much lower temperature and with a much smaller supersolid fraction. This work is done in collaboration with Eunseong Kim, Tony Clark and Xi Lin and it is supported by the (U.S.) National Science Foundation.