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**Evidence for a BCC to HCP Phase Transition for Solid Helium in Porous Vycor Glass at 100 bar and 800 mK**[1] LAURENCE LURIO, SAMBHUNATH BERA, JONATHAN MALONEY, Department of Physics Northern Illinois University, NORBERT MULDERS, Department of Physics, University of Delaware, ZHIGANG CHENG, MOSES CHAN, Department of Physics, Pennsylvania State University, CLEMENT BURNS, Department of Physics, Western Michigan University, ZHAN ZHANG, Argonne National Laboratory — In 2004, Kim and Chan[2] found evidence that solid helium grown in porous vycor glass exhibited changes in rotational inertia at millikelvin temperatures similar to that observed for superfluids. The nature of this putative supersolid phase is a question of current debate. Subsequent experiments have shown that supersolid behavior depends strongly on crystal quality. For the case of solid helium in vycor, little is known about the crystal quality, or even the crystal phase. In the present work we have performed transmission x-ray diffraction experiments on solid helium in porous vycor glass, over a range of pressures from 1 bar to 162 bar. At pressures up through 96 bar a single peak is observed in the diffraction pattern. At 114 bar and above this peak is observed to split into three peaks. We tentatively identify the low pressure phase as BCC and the high pressure phase as coexistence between BCC and HCP. We interpret the absence of higher order peaks as due to a combination of zero-point motion and defects.

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[2]Kim, E. and Chan, M. H. W., Nature 427, 225 (2004).

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