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Superfluidity of Dense ^{4}Helium in Vycor SAAD KHAIRALLAH, Dept. of Physics, University of Illinois at Urbana-Champaign, Urbana, IL 61801 , DAVID CEPERLEY, NCSA and Dept. of Physics, University of Illinois at — We calculate properties of a model of ^{4}He in Vycor using the Path Integral Monte Carlo method to understand the recent experiments of Kim and Chan. In particular we calculate both the density and the superfluid response in the layers immediately above a rough vycor surface. In the second and third layers above the vycor, there is small but not insignificant delocalization caused by the strong density gradient and resulting incommensurate lattice structure. We also find that ^{3}He impurities tend to populate these layers, which reduces the superfluid density as is found in the experiment. Our results are consistent with the persistent liquid layer model to explain the observations.

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