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Effect of Helium on Vycor Glass: Anomalous Thermal Conductivity Reduction[1] ZHIGANG CHENG, SAMHITA BANAVAR, MOSES H. W. CHAN, The Pennsylvania State University — There is a long history of studying helium adsorbed in Vycor. In this talk we present the results showing that helium can have a profound effect on the thermal conductivity property of Vycor glass. Although the thermal conductivity of liquid ^{4}He is four orders of magnitude higher than that of Vycor, the filling of liquid ^{4}He inside the Vycor pores brings about a three-fold reduction of the thermal conductivity as compared with empty Vycor between 0.06 and 0.5 K. By comparing these results with that of superfluid films, liquid ^{3}He and solid helium in the Vycor pores, we found that heat is conducted primarily through the silica network even when the pores are filled with solid or liquid helium. The dramatic reduction is brought about by the presence of slow sound mode in liquid ^{4}He that greatly facilitates the quantum tunneling of the two level systems (TLS) in the silica which enhances the scattering of the thermal phonons.

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