

Abstract Submitted
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Mass transport in micrometer size solid He-4 ARIEL HAZIOT, DUK YOUNG KIM, MOSES CHAN, The Pennsylvania State University — We have studied the transport of ^4He atoms through a thin solid ^4He slab of $\sim 50 \mu\text{m}$ thick sandwiched between two superfluid 'electrodes' of liquid helium filled Vycor rods. The geometry of the experiment is similar to the configuration used by Hallock and collaborators at the University of Mass [1,2] however the thickness of our solid sample is about 8000 times thinner than the UMass solid sample. The observed mass flow through the solid slab shows the characteristic of a superflow and the rate is more than a 1000 times higher than the UMass experiment. The mass flow rate decreases strongly with the pressure to vanish around 31 bar and it shows an hysteresis loop as a function of pressure. In contrast to the UMass experiment, the mass flow rate in our experiment decreases weakly and smoothly with increasing temperature between 30 mK and 1.2 K. In addition, we found no dependence on the ^3He concentration from 3 ppm to 1%.

- [1] M. Ray and R. B. Hallock, *Physical Review Letter* **100**, 235301 (2008)
[2] Ye. Vekhov, W. J. Mullin and R. B. Hallock, *Physical Review Letter* **113**, 035302 (2014)

Ariel Haziot
The Pennsylvania State University

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