

Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Evidence of a Proximity Effect in Liquid Helium¹ MARK O. KIMBALL, JUSTIN K. PERRON, FRANCIS M. GASPARINI, University at Buffalo, The State University of New York — We report measurements of the specific heat of helium confined to $(2\ \mu\text{m})^3$ boxes connected via a 32 nm thick film. The spacing between the ~ 34 million boxes arranged in a square array is $4\ \mu\text{m}$ edge-to-edge. The specific heat is compared to a similar measurement of helium confined to the same size boxes where the spacing between boxes is $2\ \mu\text{m}$. Evidence of a coupling between the boxes in the tighter packed array is seen in a temperature region where the filling film is in the normal state. We also report measurements of the superfluid fraction of the film connecting the boxes in the present experiment. The superfluid state persists to higher temperatures than that expected on the basis of finite-size scaling for a 32 nm film. At the temperatures where the measurement of the film occurs, the helium in the boxes is already superfluid indicating, perhaps, the modification in behavior of a thin film in proximity to larger regions of superfluid.

¹This work is supported by the National Science Foundation, DMR-0605716, and the Cornell NanoScale Science and Technology Facility, 526-94.

Mark O. Kimball
University at Buffalo, The State University of New York

Date submitted: 21 Nov 2008

Electronic form version 1.4