

The Road to the KT Transition; Experiments with Thin ^4He Films

John D. Reppy

Laboratory of Atomic and Solid State Physics, Cornell University, Ithaca NY 14851, USA.

The study of the properties of ^4He films adsorbed on a variety of substrates allows an insight into the influence of topology on the nature of superfluidity in two and three-dimensional systems. A variety of experimental techniques have been applied in these studies, including persistent current, 3rd sound, vibrating microbalance, heat capacity, and torsional oscillator measurements. Of particular interest here will be the physical realization of the Berzinskii-Kosterlitz-Thouless transition for ^4He films adsorbed on 2-D substrates as demonstrated in microbalance, 3rd sound and torsional oscillator measurements. Although the original description of the superfluid transition for thin ^4He films, as given by Kosterlitz and Thouless, applies to the static case, their approach can be extended to the dynamic situation appropriate for the actual experimental measurements. The temperature dependence of the dissipation and superfluid mass of the 2-D ^4He film, such as observed in torsional oscillator measurements, provides excellent agreement with the predictions of the dynamic KT theory.

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