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Investigating the Role of Disorder in the Two-Dimensional Superfluid Transition D.R. LUHMAN, L.R. WADLEIGH, P.G. BUMCROT, Carleton College — The superfluid transition in two-dimensional helium films is an example of a Berezinskii-Kosterlitz-Thouless transition. Characteristic features of the superfluid transition, such as the abrupt onset of superfluidity, have been observed to be significantly altered in disordered two-dimensional systems. We are in the initial stages of experiments aimed at understanding the role of disorder in the two-dimensional superfluid transition. Disorder is introduced into the system by adsorbing helium films to CaF_2 surfaces with varying roughness. Quantitative characterization of the roughness of these films is crucial to understanding the superfluid transition in a disordered environment and is our current focus. The overall scope and goals of our experiments will be presented along with some of the challenges of doing low temperature physics in the undergraduate setting. The important role that undergraduates have played in these experiments will also be discussed.

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