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Thinning of superfluid films: critical effects immediately below the λ point AVIVA SHACKELL, Department of Physics, UCLA, ROYA ZANDI, Department of Physics, UCR, JOSEPH RUDNICK, Department of Physics, UCLA, MEHRAN KARDAR, Department of Physics, MIT, LINCOLN CHAYES, Department of Mathematics, UCLA — Experiments on ^{4}He films reveal the presence of an attractive Casimir-like force at the bulk λ-point and in the superfluid regime. We address the unexpectedly large magnitude of that force in the regime immediately below the λ point. A simple mean field calculation incorporating the appropriate boundary conditions and adjusted for the renormalizing effects of critical fluctuations points to the source of this dramatic behavior. We find that the location of the minimum of the scaling function is at $x = tL^{1/\nu} = -\pi^2$ in excellent agreement with the experimental finding of $x = tL^{1/\nu} = -9.7 \pm 0.8$. Other aspects of the effective force induced by critical fluctuations will also be discussed.

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