

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Vortex-Loop Thermodynamics of Superfluid ^4He Under Pressure¹ ANDREW FORRESTER, GARY A. WILLIAMS, UCLA —
The thermodynamic quantities of pressurized superfluid ^4He near the λ -transition are calculated using a vortex-loop renormalization method. The superfluid density, specific heat, vortex core size, and vortex core energy are determined as functions of pressure and temperature, and compared with experiments. The theory predicts exponents describing the critical behavior of the superfluid density and specific heat that are in agreement with recent high-precision theoretical simulations. The vortex core size is found to increase with pressure, while the core energy decreases, the behavior found experimentally for both parameters. The specific heat, though strongly dependent on both of these parameters, is found to scale with pressure in agreement with experimental measurements.

¹Work supported by the NSF, DMR 09-06467

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Date submitted: 19 Nov 2010

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