

Thermodynamic Measurements Near the Liquid-Gas Critical Point of ^3He

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An experiment called MISTE (Microgravity Scaling Theory Experiment) is now being developed by NASA to fly in the LTMPF (Low Temperature Microgravity Physics Facility) on the International Space Station. The main objective of this flight experiment is to perform continuous in-situ PVT , specific heat at constant volume, C_v and isothermal susceptibility, χ_T , measurements in the asymptotic region of the ^3He critical point. On the ground, gravity induced density gradients exclude precision measurements in the asymptotic region. In preparation for this microgravity flight, precision ground-based experiments are now being performed in the crossover region away from the critical point to determine the leading crossover amplitudes. Recent C_v and χ_T measurements along the critical isochore have been analyzed using a new parametric crossover equation-of-state and a field theoretical Renormalization Group calculation based upon the ϕ^4 model. A description of the experimental techniques and results of these theoretical analyzes will be presented.