Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Heat-transport measurement in a turbulent fluid above the critical point[1] GUENTER AHLERS, JIN-QIANG ZHONG, UCSB — Below the critical point (CP) at P_c, T_c liquid and vapor co-exist along a line $T_\phi(P)$ in the temperature-pressure plane. When a fluid at $P < P_c$ and in the presence of gravity is heated from below and the resulting temperature difference $\Delta T = T_b - T_t$ (T_b and T_t are the temperaturs at the bottom and top of the sample respectively) straddles T_ϕ, then liquid can condense at the top and drop to the bottom. By virtue of the latent heat of vaporization this process will contribute strongly to the effective conductivity λ_{eff} of the sample. Since the latent heat vanishes at the CP, one would expect this enhancement to vanish as $P \to P_c$ from below. We measured λ_{eff} using ethane close to but **above** the CP along various isobars using a constant ΔT and varying $T_m = (T_t + T_b)/2$. Contrary to our expectations, even for $P > P_c$ we found that λ_{eff} had a maximum for T_m close to the temperature corresponding to the critical isochore and reached values well above those expected for a single-phase Boussinesq fluid at the same Rayleigh numbers.

[1]Supported by NSF Grant DMR07-02111

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Date submitted: 01 Aug 2007 Electronic form version 1.4