Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Search for the "ultimate state" in turbulent Rayleigh-Bénard convection[1] GUENTER AHLERS, Dept. of Physics, UCSB, DENIS FUNFSCHILLING, LSGC CNRS, Nancy, EBERHARD BODENSCHATZ, MPI for Dyn. and Selforg., Göttingen — Measurements of the Nusselt number Nu will be reported for turbulent Rayleigh-Bénard convection of a cylindrical sample. They cover the Rayleigh-number range $10^{11} \lesssim Ra \lesssim 2 \times 10^{15}$ using N_2 ($Pr = 0.72$) and SF_6 ($Pr = 0.79$ to 0.84) at pressures up to 19 bars and near-ambient temperatures. The sample had a height $L = 2.24$m and diameter $D = 1.12$m and utilized the high-pressure vessel known as the "Uboot of Göttingen" at the Max Planck Institute for Dynamics and Self-Organization in Göttingen, Germany. For $Ra \lesssim 4 \times 10^{13}$ the data yielded $Nu \propto Ra^{\gamma_{eff}}$ with $\gamma_{eff} = 0.308$ and did not show the transition near $Ra = 10^{11}$ to an "ultimate regime" that was reported by Chavanne et al. At $Ra = 4 \times 10^{13}$ there is a well defined but continuous transition to a regime where γ_{eff} is smaller than 0.30.

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Date submitted: 06 Aug 2009

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