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Heat transport near the transition to the ultimate state of turbulent Rayleigh-Bénard convection[1] GUENTER AHLERS, UC Santa Barbara, XIAOZHOU HE, MPIDS Göttingen, Germany, DENIS FUNFSCHILLING, LSGC CNRS Nancy, France, HOLGER NOBACH, EBERHARD BODENSCHATZ, MPIDS Göttingen, Germany — Measurements of the Nusselt number Nu for Rayleigh-Bénard convection (RBC) of a cylindrical sample over the Rayleigh-number range $2 \times 10^{12} \leq Ra \leq 2 \times 10^{15}$ and the Prandtl-number range $0.79 \leq Pr \leq 0.86$ are presented. The aspect ratio $\Gamma \equiv D/L$ was 0.50 ($D = 1.12$ m was the diameter and $L = 2.24$ m was the height). For $Ra \leq 2 \times 10^{13}$ the data yielded $Nu = Nu_0 Ra^{\gamma_{eff}}$ with $\gamma_{eff} = 0.312$, consistent with classical RBC.[2] For larger Ra γ_{eff} increased, reaching approximately $\gamma_{eff} = 0.38$ near $Ra = 10^{15}$, consistent with predictions[3,4] for an ultimate state with turbulent boundary layers.

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Guenter Ahlers
UCSB

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