Abstract Submitted
for the DFD06 Meeting of
The American Physical Society

How is the large-scale flow influenced by the aspect-ratio in turbulent cylindrical Rayleigh-Bénard samples?[1] DENIS FUNFSCHILLING, GUENTER AHLERS, Department of Physics and iQCD, University of California, Santa Barbara, CA93106 — In turbulent Rayleigh-Bénard convection the fluid develops a large-scale flow (LSF). The shadowgraph method is used to visualize plumes in cylindrical samples that are emitted from a top and bottom boundary layer. These plumes serve as tracers of the LSF. In aspect-ratio $\Gamma \equiv D/L = 1$ (D and L are the diameter and height of the cell respectively), the LSF consists of a single roll circulating in a near-vertical plane and oscillating azimuthally with a well defined frequency[2]. For $\Gamma = 2$ and 3, the LSF still consists of a single roll but has no detectable oscillations. For $\Gamma = 2$ and 3 the "density" of plumes above the bottom plate (the ratio of the area occupied by the plumes to the total area) does show clear oscillations at a well defined frequency. This later observation adds new interest to a model of plume emission by Villermaux[3]. Our results provide evidence for a transition in the LSF dynamics between $\Gamma = 1$ and $\Gamma = 2$.

[1]Supported by DOE Grant DE-FG02-03ER46080.
[2]D. Funfschilling and G. Ahlers, Phys. Rev. Lett. **92**, 194502 (2004).
[3]E. Villermaux, Phys. Rev. Lett. **75**, 4618 (1995)

Denis Funfschilling
Department of Physics and iQCD,
University of California, Santa Barbara, CA93106

Date submitted: 06 Aug 2006 Electronic form version 1.4