# TRANSITION TO THE ULTIMATE REGIME IN A RADIATIVELY DRIVEN CONVECTION EXPERIMENT

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I will report on the transition between two regimes of heat transport in a radiatively driven convection experiment, where a fluid gets heated up within a tunable heating length $\ell$ in the vicinity of the bottom of the tank. The first regime is similar to the one observed in standard Rayleigh-Bénard experiments, the Nusselt number $Nu$ being related to the Rayleigh number $Ra$ through the power-law $Nu \sim Ra^{1/3}$ [1]. The second regime corresponds to the "ultimate" or mixing-length scaling regime of thermal convection [2, 3], where $Nu$ varies as the square-root of $Ra$. Evidence for these two scaling regimes have been reported in Lepot et al. [4], and I will present a detailed study of the transition from one regime to the other. I will introduce a simple model describing radiatively driven convection in the mixing-length regime, which leads to the scaling relation $Nu \sim \frac{\ell}{H} Pr^{1/2} Ra^{1/2}$, where $H$ is the height of the cell and $Pr$ the Prandtl number. From this model, one can deduce the values of $Ra$ and $Nu$ at which the system transitions from one regime to the other. These predictions are confirmed by the experimental data gathered at various $Ra$ and $\ell$ [5].

## References

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