

Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Local Wall Heat Flux¹ ROBERT KAISER, RONALD DU PUIITS, University of Technology Ilmenau — Thermal convection is an omnipresent mechanism in nature and industry whereas its complexity is still a great challenge for scientists. A common model system to study natural thermal convection is the Rayleigh-Bénard setup. The flow inside a RB convection cell is driven by a temperature difference between top and bottom plate, while the heat loss throughout the sidewall is suppressed. A lot of effort has been taken to measure the global heat transport at high Ra spanning a wide Pr range. However, it is still unclear how it is locally distributed at the horizontal plates and how this distribution depends on the aspect ratio. We report local wall heat flux measurements using heat flux sensors at the surface of the heating plate. The measurements have been carried out in our large-scale RB experiment, called the “Barrel of Ilmenau” at $Ra = 4 \cdot 10^9$ varying $1 < \Gamma < 8$ and $Ra = 10^8$ varying $4 < \Gamma < 20$. Own measurements in a small rectangular RB cell shows that the time-average of the local heat flux at the surface of the plates can vary with respect to the position at the plate by about 30%. The locations of enhanced heat flux could be clearly associated with regions of strong plumeactivity like the area where plumes coming from the opposite plate and hit the plate surface.

¹DFG PU 436/3-2

Robert Kaiser
University of Technology Ilmenau

Date submitted: 19 Jun 2013

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