Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

**Viscous boundary layers in turbulent Rayleigh-Bénard convection at low Prandtl number**[1] RONALD DU PUITS, CHRISTIAN RESAGK, Technische Universitaet Ilmenau, WILLERT CHRISTIAN, German Aerospace Center — We present time-resolved Particle Image Velocimetry measurements of the flow adjacent to the horizontal plates in turbulent Rayleigh-Bénard convection (RBC) for the Rayleigh number $Ra = 1.4 \times 10^{10}$ and the Prandtl number $Pr = 0.7$. The measurements have been undertaken in a large-scale RB experiment 7.15 m in diameter and 6.30 m in height which is called the "Barrel of Ilmenau." They give detailed insight into the near-wall flow field in turbulent RB convection and provide experimental data to evaluate various competing theories on the heat transport. We characterize the flow field by analyzing typical quantities like the mean velocity profile and its fluctuations, the spatial and temporal evolution of the vorticity inside the boundary as well as the wall shear stress and its correlation with the outer flow. We will also show that the convective boundary layer becomes turbulent locally and temporarily although its shear Reynolds number $Re_s = U_\infty \delta/\nu \approx 265$ ($U_\infty$ - outer velocity, $\delta$ - boundary layer thickness, $\nu$ - kinematic viscosity) is considerably smaller than the value 420 underlying existing phenomenological theories.

[1]DFG grant PU 436/1-2, EuHIT

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Date submitted: 29 Jul 2014 Electronic form version 1.4