Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Spatial organisation of large scale structures in turbulent boundary layers FELIX EICH, NICO REUTHER, MATTHEW BROSS, CHRISTIAN KAEHLER, Bundeswehr University, Munich — The experimental investigation of the spatial organization of large-scale structures in a turbulent boundary layer at large Reynolds numbers is a difficult task due to the size of the turbulent structures and their mutual distance in streamwise and spanwise directions. However, by aligning various PIV systems side by side it was possible to resolve all relevant scales simultaneously in the Reynolds number range Re_τ =4180-13355. This range of Reynolds numbers was selected to fully characterise the relevant scaling of these large structures. The measurements were performed in wall-parallel planes at several selected wall distances, to examine the variation of the average width and spanwise distance between the large scale flow structures. The acquired vector fields were analysed by means of two-point correlations. Form these correlations the average width and streamwise extent of large-scale structures was determined. Using conditional correlations, it was possible to separate and characterise the high and low speed structures. The statistical multipoint analysis shows that there are distinct variations between high and low speed structures as well as between the large-scale structures at different wall distances.

Christian Kaehler
Bundeswehr University, Munich

Date submitted: 31 Jul 2015 Electronic form version 1.4