



Sommerfeld Theory Colloquium

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Turbulence without Linear Instability

All flows show a transition from a laminar phase to a turbulent one for sufficiently high flow speeds. In many cases turbulence develops in a succession of instabilities that create flows of increasing temporal and spatial complexity (Lord Rayleigh, Sommerfeld, Heisenberg, Taylor, Landau etc), For the classroom example of pipe flow and several other flows, the linear stability analysis of the laminar profile does not reveal any instability, so that the very first point in that cascade of instabilities is absent. Over the last decade much of the mystery of the transition in pipe flow has been resolved, primarily thanks due to suitable adaptations and extensions of ideas from nonlinear dynamics. Numerical and experimental data corroborate a scenario where the appearance of new classes of fully 3d solutions and their increasing entanglement provides the key ingredients for the transition. Further studies on the spatio-temporal dynamics in the transition region, where turbulence is not space-filling, reveal intriguing similarities to the directed percolation transition in statistical mechanics.

Wednesday, 10 June 2015, 16:15h, Room A348/349, Theresienstr. 37/III

Prof. E. Frey