Fluids and Space Engineering Seminar

Date: Tuesday, July 26, 2022 at 10:00
Location: ZARM, Room 1730

Ultimate Rayleigh-Bénard and Taylor-Couette turbulence

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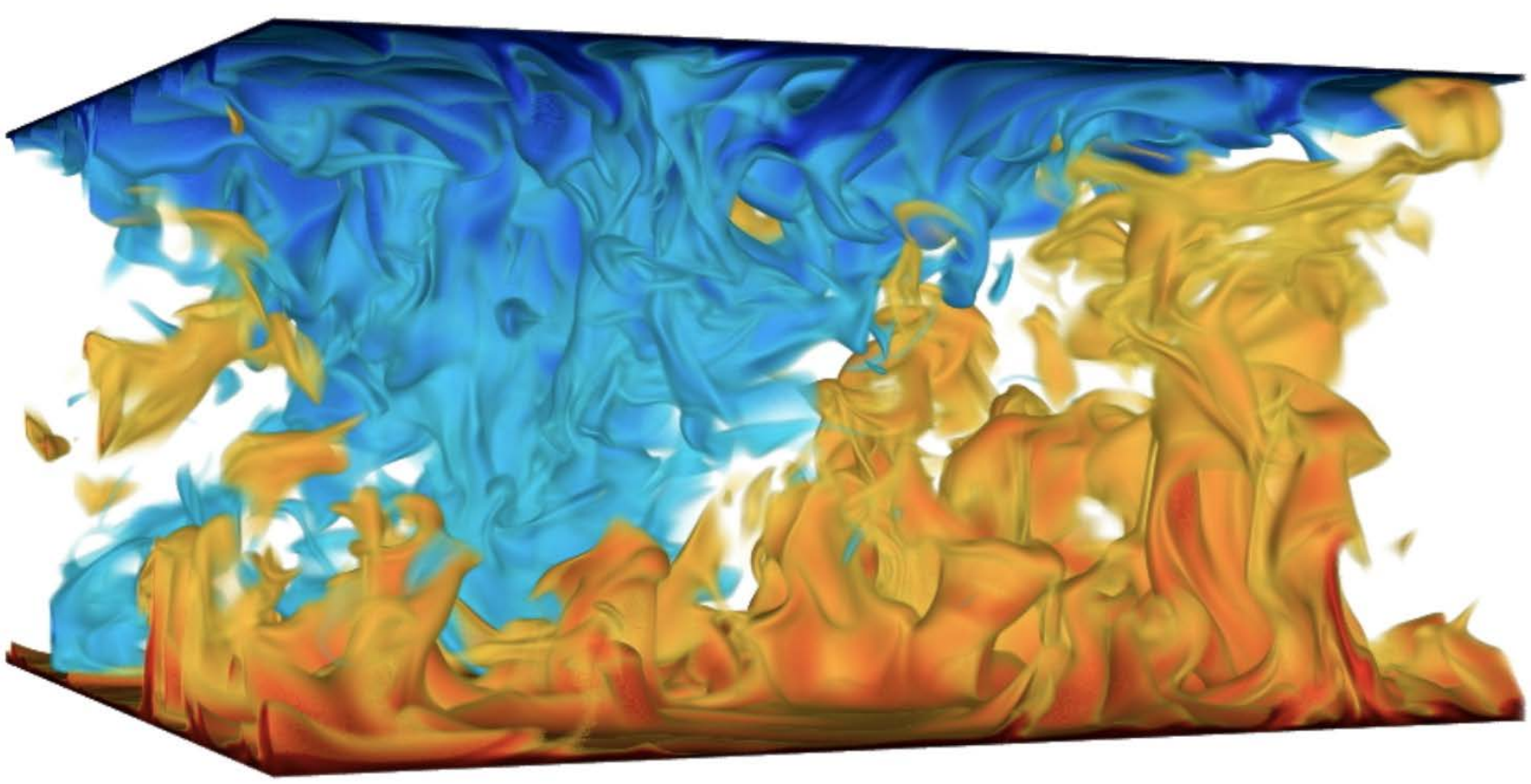

Rayleigh-Bénard flow - the flow in a box heated from below and cooled from above - and Taylor-Couette flow - the flow between two coaxial co- or counter-rotating cylinders - are the two paradigmatic systems in physics of fluids and many new concepts have been tested with them. While the low Reynolds number regime has been very well explored in the '80s and '90s of the last century, in the fully turbulent regime major research activity only developed in the last two decades. We will first briefly review this recent progress in our understanding of fully developed Rayleigh-Bénard (RB) and Taylor-Couette (TC) turbulence, from the experimental, theoretical, and numerical point of view and discuss transitions between different (turbulent) flow states. We will in particular focus on the so-called ultimate regime, in which the boundary layer has become turbulent, and which therefore has enhanced transport properties. In the last part of the talk we will discuss RB and TC turbulence with rough walls. There the results can be expressed in terms of the skin-friction factor, revealing analogy to turbulent flow in rough pipes.