Abstract Submitted
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Elusive transition to the ultimate regime of turbulent RBC: Dynamics of LSC in high-Ra cryogenic helium experiments[1] MICHAL MACEK, PAVEL URBAN, PAVEL HANZELKA, TOM KRLK, VRA MUSILOV, The Czech Academy of Sciences, Institute of Scientific Instruments, LADISLAV SKRBEK, Charles Unniversity, Faculty of Mathematics and Physics — Non Oberbeck-Boussinesq (NOB) effects may increase the heat transfer efficiency of turbulent Rayleigh-Bénard convection (RBC), when the top plate temperature approaches the saturation vapor curve (SVC) even far away from the critical point of the working fluid. Our recent experimental study [1] using cryogenic ^{4}He under conditions as close as possible to the Goettingen study using SF_6 [2] argues that the claim of having observed the transition to Kraichnans ultimate $Nu(Ra)$ scaling is likely due to NOB effects, and the important issue of transition to the ultimate state of RBC remains open. I will present here a detailed analysis of large-scale circulation (LSC) dynamics in the experiment [1]. I will discuss dependences of the Reynolds numbers associated with LSC circulation and sloshing and of the LSC reversal frequency on the position in the p-T diagram of ^{4}He, in particular on the boundary layer asymmetry due to NOB conditions near the SVC. [1] P. Urban, P. Hanzelka, T. Krlk, M. Macek, V. Musilov and L. Skrbek, Phys. Rev. E 99, 011101(R) (2019). [2] X. He, D. Funfschilling, H. Nobach, E. Bodenschatz, and G. Ahlers, Phys. Rev. Lett. 108, 024502 (2012).

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Michal Macek
The Czech Academy of Sciences, Institute of Scientific Instruments

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