Visualisation of Liquid ^{4}He Flows

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The first laboratory in Europe for the visualization of liquid helium flows is currently being established at the Charles University in Prague. Interesting and puzzling results recently obtained in overseas laboratories[1,2] are in fact posing more questions than providing clear answers. In particular, the trapping mechanisms of tracer particles into the cores of quantized vortices and the macroscopic eddies observed in thermal counterflow past circular cylinder certainly deserve further attention and study.[3]
The use of flow visualization techniques for the analysis of cryogenic flows of normal and superfluid ^{4}He is introduced and their specific features discussed. The newly implemented equipment was in particular designed in order to be potentially capable of obtaining novel results that are crucially needed for deeper understanding of the underlying physics. We present preliminary results showing that our new flow visualization system is well suited for the task of analyzing in unprecedented detail the complex interactions between tracer particles, quantized vortices and macroscopic eddies.

[1]T. Zhang, and S.W. Van Sciver, Nature Phys **1**, 36 (2005).
[2]G.P. Bewley, D.P. Lathrop, and K.R. Sreenivasan, Nature **441**, 588 (2006).
[3]Y.A. Sergeev, and C.F. Barenghi, J Low Temp Phys **157**, 429 (2009).