

Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Flow visualization in superfluid helium-4 using a thin line of He₂ excimer tracers¹ ALEX MARAKOV, University of Florida, Physics Department, and National High Magnetic Field Laboratory, JIAN GAO, Florida State University, Mechanical Engineering Department, and National High Magnetic Field Laboratory, WEI GUO, STEVEN VAN SCIVER, Florida State University, Mechanical Engineering Department, National High Magnetic Field Laboratory, GARY IHAS, University of Florida, Physics Department, DANIEL MCKINSEY, Yale University, Physics Department, WILLIAM VINEN, University of Birmingham, Physics Department — Cryogenic flow visualization techniques have been proven in recent years to be a very powerful experimental method to study turbulence in superfluid helium-4 (He II). In order to extract quantitative information of the flow field, we developed a new technique based on the generation of a thin line of He₂ excimer tracers via femtosecond-laser field ionization. These tracers move solely with the normal-fluid component in He II and can be imaged using a laser-induced fluorescence technique. Studying the drift and distortion of the tracer line in a turbulent flow shall allow us to measure the instantaneous flow velocity field and hence determine the structure functions and the energy spectrum of the turbulence. We discuss the preliminary results obtained that for the first time visually reveal the existence of a laminar-to-turbulent transition in the normal fluid in thermal counterflow.

¹W.G. acknowledges the startup support from Florida State University and the National High Magnetic Field Laboratory.

Wei Guo
Florida State University

Date submitted: 15 Nov 2013

Electronic form version 1.4