

DEPARTMENT OF PHYSICS & ASTRONOMY
CONDENSED MATTER SEMINAR

Adrian Del Maestro

Department of Physics
University of Vermont

Entanglement Area Law in Superfluid ^4He

Area laws were first discovered by Bekenstein and Hawking, who found that the entropy of a black hole grows proportional to its surface area, and not its volume. Entropy area laws have since become a fundamental part of modern physics, from the holographic principle in quantum gravity to ground state wavefunctions of quantum matter, where entanglement entropy is generically found to obey area law scaling. As no experiments are currently capable of directly probing the entanglement area law in naturally occurring many-body systems, evidence of its existence is based on studies of simplified theories. Using new exact microscopic path integral ground state Monte Carlo simulations of superfluid ^4He , we demonstrate for the first time area law scaling of entanglement entropy in a real quantum liquid in three dimensions. We validate the fundamental principles underlying its physical origin, and explore an "entanglement equation of state" showing how it depends on the density of the superfluid.

Tuesday, September 10, 2019
JFB 334
4:00 pm

Refreshments will be served in JFB 334 at 3:45 pm