- **Superfluidity in low dimensional quantum fluids**
  Adrian Del Maestro (University of Vermont)

  Superfluidity or dissipation-free flow, is rooted in quantum mechanics with the wave function of the entire fluid being described by an emergent global macroscopic phase. This breaking of the gauge symmetry can have dramatic consequences for quantum liquids at temperatures below the superfluid transition, where flow is well established through extremely narrow constrictions, impenetrable to a normal liquid. To understand how the enhancement of both thermal and quantum fluctuations affects superfluidity in the low dimensional constrictions, we have performed quantum Monte Carlo simulations measuring the superfluid response of helium-4 to the linear and rotational motion of the walls of a confining nanopore. Within the pores, the portion of the normal liquid dragged along with the boundaries is dependent on the type of motion and the resulting anisotropic superfluid density exhibits plateaus at low temperature. The origin of this saturation, which is not observed in bulk quantum fluids, is uncovered by computing the spacial distribution of superfluidity, with only the core of the nanopore exhibiting any evidence of phase coherence. We find that the superfluid core displays scaling behavior consistent with Luttinger liquid theory, providing an experimental test for the emergence of a one dimensional quantum liquid.