

Abstract Submitted
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Helium-4 crossover from a 3d superfluid to a 1d Luttinger liquid in a nanopore¹ BOHDAN KULCHYTSKY, McGill University, ADRIAN DEL MAESTRO, University of Vermont, GUILLAUME GERVAIS, McGill University — Quantum Monte Carlo studies of helium-4 below the bulk superfluid transition temperature show that when it is confined to flow in narrow cylindrical pores with nanometer radii, it tends to form concentric shells around a possible inner core. The latter potentially represents an experimental playground for exploring the implications of Luttinger liquid theory for one dimensional quantum fluids. We have performed large scale numerical simulations investigating the crossover from a bulk three dimensional superfluid to a one dimensional Luttinger liquid as the nanopore radius is reduced at low temperature. Measurements of the superfluid density employing both stiffness and angular momentum estimators provide new insights into confinement induced fluctuation effects in strongly interacting quantum fluids.

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