Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

**Particle entanglement in continuum many-body systems via quantum Monte Carlo** C.M. HERDMAN, University of Vermont, P.-N. ROY, University of Waterloo, R.G. MELKO, University of Waterloo & Perimeter Institute for Theoretical Physics, A. DEL MAESTRO, University of Vermont — Entanglement of spatial bipartitions, used to explore lattice models in condensed matter physics, may be insufficient to fully describe itinerant quantum many-body systems in the continuum. We introduce a procedure to measure the Rényi entanglement entropies on a particle bipartition, with general applicability to continuum Hamiltonians via Path Integral Monte Carlo methods. Via direct simulations of interacting bosons in one spatial dimension, we confirm a logarithmic scaling of the single-particle entanglement entropy with the number of particles in the system. The coefficient of this logarithmic scaling increases with interaction strength, saturating to unity in the strongly interacting limit. Additionally, we show that the single-particle entanglement entropy is bounded by the condensate fraction, suggesting a practical route towards its measurement in future experiments.

Chris Herdman
Univ of Vermont

Date submitted: 14 Nov 2013 Electronic form version 1.4