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Quantum Monte Carlo Simulations of Dilute Fermion Gases at Finite Temperature VAMSI AKKINENI, DAVID CEPERLEY, University of Illinois at Urbana-Champaign, NANDINI TRIVEDI, The Ohio State University — In a system of fermions with attractive interactions at low temperature, the crossover from the BCS regime to a molecular BEC, with increasing interaction strengh, is a problem of particular interest in many-body physics. The development of successful experimental techniques to trap and cool dilute gases of fermionic alkali atoms, and to tune the effective inter-atomic interaction over a wide range, have opened exciting possibilities for studying the physics of interacting fermions in this crossover region. The composition of the ground state, nature of fermion pairs, nature of excitations, pairing energy scale, and the pairing and condensation transitions are all important considerations in this crossover regime. Ab initio quantum simulations are invaluable tools for obtaining accurate values of various physical quantities of interest. We utilize the Restricted Path Integral Monte Carlo (RPIMC) technique to calculate to the energy, pairing energy, and the superfluid density at the unitarity point. We present these results along with an estimate of the critical temperature for the superfluid transition.

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