Abstract Submitted
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Ground state description of a single vortex in an atomic Fermi gas: From BCS to Bose-Einstein condensation[1] CHIH-CHUN CHIEN, University of Chicago, YAN HE, University of Chicago, QIJIN CHEN, University of Chicago, K. LEVIN, University of Chicago — We use a Bogoliubov-de Gennes (BdG) formulation to describe a single vortex in a neutral fermionic gas. It is presumed that the attractive pairing interaction can be arbitrarily tuned to exhibit a crossover from BCS to Bose-Einstein condensation. Our starting point is the BCS-Leggett mean field ground state for which a BdG approach is microscopically justified. At strong coupling, we demonstrate that this approach is analytically equivalent to the Gross-Pitaevskii description of vortices in true bosonic systems. We analyze the sizable density depletion found for the unitary regime and relate it to the presence of unoccupied (positive energy) quasi-bound states at the core center.
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