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One dimensional trapped fermions with attractive contact interactions[1] MICHELE CASULA, DAVID CEPERLEY, Department of Physics, University of Illinois at Urbana-Champaign — Recent advancements in cold atomic physics allow creation of optical lattices which reproduce well defined model Hamiltonians. This opens the route to resolve the phases of strongly correlated systems by carrying out experiments with trapped cold atoms. In this work, we study the properties of one dimensional trapped spin 1/2 fermions with attractive contact interactions by means of exact quantum Monte Carlo techniques. According to the local density approximation (LDA), such a system is expected to show phase separation between a Fulde-Ferrell-Larkin-Ovchinnikov (FFLO) state and either fully polarized or fully paired outer shells.[1] Here we show how the size and temperature affect the LDA phase boundaries. Mapping out the dependence on the number of particles, temperature, and interaction strength is extremely useful to benchmark experiments where cold atoms are trapped in arrays of cigar-shaped tubes, and understand whether the related setup will be able to detect the signatures of the FFLO state.
[1] G. Orso, Phys. Rev. Lett. 98, 070402 (2007).

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