Two-component Fermi gases with unequal masses in a harmonic trap.[1] JAVIER VON STECHER, Department of Physics and JILA, University of Colorado, Boulder, Colorado 80309-0440, DOERTE BLUME, JILA, University of Colorado, Boulder, Colorado 80309-0440 and Department of Physics and Astronomy, Washington State University, Pullman, WA 99164, CHRIS H. GREENE, Department of Physics and JILA, University of Colorado, Boulder, Colorado 80309-0440 — Dilute two-component Fermi gases with equal masses and tunable interspecies scattering length have been realized experimentally. Motivated by experimental efforts to simultaneously cool and trap two different fermionic species, we theoretically investigate the behaviors of trapped two-component Fermi gases with varying mass ratio in the crossover regime, including infinitely strongly-interacting systems. We determine the energy spectrum of the four-body system using essentially exact basis set diagonalization techniques and using the fixed-node diffusion Monte Carlo method. By comparing the energies obtained by these two approaches, we assess the quality of the nodal surface used in the Monte Carlo calculations. Our results allow, for example, for the determination of the dimer-dimer scattering length. Finally, we present Monte Carlo results for larger systems.

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