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Pairing and superfluid properties of dilute fermions with unequal masses[1] CHIEN-HUA PAO, SHIN-TZA WU, Department of Physics, Nat'l Chung Cheng University, SUNGKIT YIP, Institute of Physics, Academia Sinica — We study the pairing between Fermions of different masses in a harmonic trap potential. Within the mean field theory, we calculate the density profiles systemically for the weak coupling BCS, the unitary limit, and the strong coupling BEC regimes. For a system with spin population imbalance, we found that the system is phase separated into concentric shells with the superfluid in the core surrounded by the normal fermion gas in both the weak-coupling BCS side and at unitary limit. In the strong-coupling BEC side, the composite bosons and left-over fermions can be mixed. The density profiles for unequal mass Fermions can be drastically different from their equal-mass counterparts in the unitary limit. We will discuss some possible experiments with different mass ratios which exhibit different ground state properties compared to the equal masses cases.

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