Abstract Submitted
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Thermodynamics of the two-component Fermi gas with unequal masses at unitarity[1] K.M. DAILY, D. BLUME, Washington State University — We consider mass-imbalanced two-component Fermi gases for which the unequal-mass atoms interact via a zero-range model potential with a diverging s-wave scattering length a_s, i.e., with $1/a_s = 0$. The high temperature thermodynamics of the harmonically trapped and homogeneous systems are examined using a virial expansion approach up to third order in the fugacity. We find that the universal part of the third-order virial coefficient associated with two light atoms and one heavy atom is negative, while that associated with two heavy and one light atom changes sign from negative to positive as the mass ratio κ increases, and diverges when Efimov physics sets in at $\kappa = 13.61$. By examining the Helmholtz free energy, we find that the equilibrium polarization of the trapped and homogeneous systems is 0 for $\kappa = 1$, but finite for $\kappa \neq 1$ (with a majority of heavy particles). Compared to the equilibrium polarization of the non-interacting system, the equilibrium polarization at unitarity is increased for the trapped system and decreased for the homogeneous system. We find that unequal-mass Fermi gases are stable for all polarizations.

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