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Equation of state of Bose and Fermi systems beyond s-wave determined by the lowest order constrained variational method: large scattering length limit RYAN KALAS, Washington State University, DOERTE BLUME, Washington State University, and JILA, University of Colorado — Dilute Fermi systems with large s-wave scattering length a_s exhibit universal properties if the interparticle spacing r_o greatly exceeds the range of the underlying two-body interaction potential. In this regime, r_o is the only relevant length scale and observables such as the energy per particle depend only on r_0 (or, equivalently, the energy E_{FG} of the free Fermi gas). We investigate Bose and Fermi systems with non-vanishing angular momentum using the lowest order constrained variational (LOCV) method. We focus on the regime where the generalized scattering length becomes large and determine the relevant length scales at unitarity. We obtain simple expressions for the energy per particle in terms of a combined l-dependent length scale ξ_l. For example, within the LOCV framework the energy per particle of p-wave and d-wave interacting fermions depends not only on E_{FG}, as in the case of s-wave fermions, but also on an energy scale that depends on the range of the underlying two-body potential. Furthermore, we investigate the behaviors of s-wave interacting Bose and Fermi systems in the non-universal, density-dependent regime. *Supported by NSF.

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