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Density Functional Theory for non-relativistic Fermions in the Unitarity Limit GAUTAM RUPAK, Mississippi State University, THOMAS SCHAEFER, North Carolina State University — We derive an energy density functional for non-relativistic spin one-half fermions in the limit of a divergent two-body scattering length. Using an epsilon expansion around $d = 4 - \epsilon$ spatial dimensions we compute the coefficient of the leading correction beyond the local density approximation (LDA). In the case of N fermionic atoms trapped in a harmonic potential this correction has the form $E = E_{LDA}[1 + c_s(3N)^{-2/3}]$, where E_{LDA} is the total energy in LDA approximation. At next-to-leading order in the ϵ -expansion we find $c_s = 1.68$, which is significantly larger than the result for non-interacting fermions, $c_s = 0.5$.

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