Describing the degenerate Fermi in a renormalized hyperspherical treatment[1] SETH T. RITTENHOUSE, JAVIER VON STECHER, CHRIS H. GREENE, Department of Physics and JILA, University of Colorado, Boulder CO 80309-0440 — We describe the degenerate Fermi gas with zero-range density-dependent renormalized interactions (eprint cond-mat/0610848) in an isotropic trap using a variational hyperspherical approach. This method reduces the complex many body Hamiltonian to a simple one-dimensional effective potential in a collective coordinate, the hyperradius, which can be thought of as the rms size of the gas. Exploring the behavior of the effective potential in the unitarity region where the two-body scattering length becomes very large and negative produces interesting effects. The low energy collective excitation frequency of a two spin component gas approaches the noninteracting frequency, as has been seen in hydrodynamic treatments. For larger numbers of spin components an interesting dynamical instability develops.

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