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Thermodynamics of ultracold fermions in traps in the strongly interacting regime[1] QIJIN CHEN, University of Chicago, JELENA STAJIC, Los Alamos National Lab, KATHRYN LEVIN, University of Chicago — We discuss the entropy S, energy E for trapped fermionic gases, over the entire range from BCS to BEC, and over all T from below to above T_c. Our work, which is based on the conventional mean field ground state, shows that both "bosonic" and fermionic excitations contribute to S, and that boson-fermion interactions are essential. Trap edge effects lead to low T power law contributions for the fermions in the unitary and BCS regimes, while bosons contribute to S with a $T^{3/2}$ dependence. Comparison with recent experiments by the Thomas group (cond-mat/0409283) shows very good quantitative agreement. This lays the groundwork for implementing thermometry in strongly interacting Fermi gases.

1. Q.J. Chen, J. Stajic, and K. Levin, *Thermodynamics of ultracold fermions in traps*, cond-mat/0411090; submitted to **Science**.
2. J. Stajic, Q.J. Chen, K.Levin, *Measuring condensates in fermionic superfluids via density profiles in traps*, cond-mat/0408104.
3. Q.J. Chen, J. Stajic, S.N. Tan, K. Levin, *BCS-BEC crossover: From high temperature superconductors to ultracold superfluids*, cond-mat/0404274.

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