Thermodynamics of ultracold Fermi gases

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Understanding the properties of strongly correlated quantum many-body systems is one of the most challenging problems in modern physics. In the recent years, ultracold atomic gases have emerged as new quantitative testbeds for the theoretical paradigms developped in the study of condensed matter phenomena: they provided the first experimental demonstration of the BEC-BCS crossover scenario connecting Bose-Einstein condensation of pairs and BCS theory, probed the Clogston-Chandrasekhar limit of superconductivity or confirmed the 50-year old prediction for the beyond-mean field corrections to the equation of state of dilute Bose and Fermi gases.

In this talk, I will review the recent results obtained in the quantitative study of the thermodynamic properties of strongly interacting gases. I will discuss how the advent of new experimental tools have led to an accurate determination of the equation of state of dilute Bose and Fermi gases, and how these results could be compared quantitatively to the most advanced theoretical calculations.