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The Equation of State of a Strongly Interacting Fermi Gas NIR NAVON, SYLVAIN NASCIMBÈNE, KAIJUN JIANG, FRÈDÈRIC CHEVY, CHRISTOPHE SALOMON, Laboratoire Kastler-Brossel, Ecole Normale Superieure (ENS) — In this talk, we will present recent experimental work on the thermodynamics of strongly interacting Fermi gases. We have developed a general method to probe with high precision the Equation of State (EoS) of locally homogeneous ultracold gases [1]. This allows stringent tests of recent many-body theories. First, we focus on the finite-temperature EoS of the unpolarized unitary gas. Precise thermometry is provided by adding to the Fermi gas of 6 Li a trace of bosonic 7 Li. We show that the low-temperature properties of the strongly interacting normal phase are well described by Fermi liquid theory and we localize the superfluid transition. Second, we address the zero-temperature EoS of the spin-polarized system. Surprisingly, despite strong interactions, the polarized phase behaves as a mixture of two ideal gases: a Fermi gas of majority atoms and a non-interacting gas of dressed quasi-particles, the Fermi polarons. Finally, we will report on work in progress on the extension of our study to the BEC-BCS crossover [2].

 S. Nascimbene and N. Navon, K. Jiang, F. Chevy, C. Salomon, arXiv:0911.0747, Nature (in press, 2010)

[2] N. Navon and S. Nascimbene, F. Chevy, C. Salomon, in preparation (2010)

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