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**Understanding the Mass-Imbalanced Highly-Polarized Fermi Gases** MICHAEL KOLODRUBETZ, BRYAN CLARK, Princeton University —  
The phase diagram of spin-polarized single atomic species Fermi gases has been well-studied theoretically and experimentally. However, cold gases containing multiple atomic species open up the possibility of seeing more exotic states. Recent variational calculations (arXiv:1002.0101v2 [cond-mat.quant-gas]) suggest a complicated phase diagram for a light impurity interacting via a short-range potential with a sea of heavier fermions. In particular, at large mass ratio the polaron is expected to give way to more complicated many-body bound states, such as the trimer or the FFLO molecule. We extend these results beyond this variational ansatz, sampling over many-body states with an arbitrary number of particle-hole pairs. We will discuss the phase diagram resulting from these simulations, including implications for the stability of the trimer and FFLO phases.

Michael Kolodrubetz  
Princeton University

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