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Probing upper branch physics in strongly interacting Fermi gases[1]
SHIZHONG ZHANG, The Ohio State University, EDWARD TAYLOR, McMaster University, WILLIAM SCHNEIDER, MOHIT RANDERIA, The Ohio State University — Motivated by a recent experiment at MIT, we consider the collision of two clouds of spin-polarized atomic Fermi gases close to a Feshbach resonance. We explain why two dilute gas clouds, with attractive interactions between its constituents, bounce off each other as if they were billiard balls. Our hydrodynamic analysis, in excellent agreement with experiment, gives strong evidence for a novel metastable many-body state, the so-called upper branch, with repulsive effective interactions. We also propose another experiment, measuring spin decoherence rates, to study the physics of the upper branch.

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