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Formation Time of a Fermion Pair Condensate MARTIN W. ZWIERLEIN, CHRISTIAN H. SCHUNCK, CLAUDIU A. STAN, SEBASTIAN M.F. RAUPACH, WOLFGANG KETTERLE, MIT — Atomic Fermi gases close to a Feshbach resonance offer the unique possibility to study a strongly interacting many-body system with tunable interactions. At ultracold temperatures, fermions form bosonic pairs which can condense into the ground state of the confining potential. The nature of the pairs depends on the interaction strength: The atoms can be either tightly bound into a small molecule or they can form long-range pairs, whose size can become comparable to or even larger than the interparticle spacing. We studied the formation time of a condensate of fermionic atom pairs close to a Feshbach resonance. This was done using a phase-shift method in which the delayed response of the many-body system to a modulation of the interaction strength was recorded. The observable was the fraction of condensed molecules in the cloud after a rapid magnetic field ramp across the Feshbach resonance. The measured response time was slow compared to the rapid ramp, which provides final proof that the molecular condensates reflect the presence of fermion pair condensates before the ramp.

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