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Measuring contact dynamics of a Fermi gas at a Feshbach resonance CHRIS LUCIUK, ALMA BARDON, DAN FINE, NATHAN CHENG, SCOTT BEATTIE, STEFAN TROTZKY, JOSEPH THYWISSEN, University of Toronto, Department of Physics, Toronto (ON), Canada — In 2005, S. Tan derived a series of universal relations for strongly interacting Fermi gases built around a single central parameter called the "contact." Subsequently, the contact parameter has been measured in experiments with trapped ultracold Fermi gases, allowing for a verification of some of these relations. We use quantum degenerate clouds of K-40 to study the non-equilibrium dynamics of the contact, initialized in either a coherent superposition or in an incoherent mixture of two different internal states. In the superposition case, we find the contact dynamics to be connected to the single-particle coherence dynamics. We make use of a Feshbach resonance to tune the interactions of the Fermi gas and find the short-time dynamics to be different in the BEC and BCS regime. When the superposition has fully decohered, the time-evolution is governed by atom loss to a molecular bound state. We discuss our measurement technique, including cooling & initialization, fast RF spectroscopy, and spin-resolved imaging.

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