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Evidence for universal relations describing a gas with p-wave interactions S. SMALE, C. LUCIUK, S. TROTZKY, University of Toronto, ZHENHUA YU, Institute for Advanced Study, Tsinghua University, SHIZHONG ZHANG, University of Hong Kong, J. H. THYWISSEN, University of Toronto — A remarkable set of universal relations is known to directly connect thermodynamic and microscopic properties of interacting Fermi gases. So far, these contact relations have been established only for interactions with s-wave symmetry, i.e., with zero relative angular momentum. We report measurements of two new physical quantities, the p-wave contacts, and present evidence [1] that they encode the universal aspects of p-wave interactions through recently proposed relations [2,3]. Our experiments use a spin-polarized ultracold Fermi gas of ^{40}K, in which s-wave interactions are suppressed, while p-wave interactions are enhanced near a Feshbach resonance. Using time-resolved spectroscopy and momentum distribution measurements, we study how correlations in the system develop after quenching the atoms into an interacting state. Combining quasi-steady-state measurements with new contact relations, we infer an attractive p-wave interaction energy as large as the Fermi energy. Our results reveal new ways to understand and characterize the properties of resonantly interacting p-wave quantum gases. [1] C. Luciuk et al., Nature Phys. to appear (2016); [2] S. M. Yoshida, M. Ueda, PRL 115, 135303 (2015); [3] Zhenhua Yu, J. H. Thywissen, Shizhong Zhang, PRL 115, 135304 (2015).

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