

Abstract Submitted  
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**Probing Interactions Between Ultracold Fermions** GRETCHEN CAMPBELL, ANDREW LUDLOW, JAN THOMSEN, MARTIN BOYD, MICHAEL MARTIN, SEBASTIAN BLATT, MATTHEW SWALLOWS, TRAVIS NICHOLSON, JUN YE, JILA, NIST and University of Colorado — At ultracold temperatures, the Pauli exclusion principle suppresses collisions between identical fermions. This has been a strong motivation for the development of optical atomic clocks using fermionic isotopes. However, using a  $^{87}\text{Sr}$  optical lattice clock we recently measured density-dependent frequency shifts of the clock transition. A systematic study of these collision effects has been completed and we have developed a theoretical model which provides a fundamental description of fermionic interactions including the effect of the measurement process on the dynamic evolution of the two particle correlation function. Importantly, for clock operations we have also identified experimental conditions that allow this density shift to be zeroed out.

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