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Clock shift in a strongly interacting two-dimensional Fermi gas[1]
CHRISTIAN LANGMACK, The Ohio State University, MARCUS BARTH, WILHELM ZWERGER, Technische Universitat Munchen, ERIC BRAATEN, The Ohio State University — We derive universal relations for the radio-frequency (rf) spectroscopy of a two-dimensional Fermi gas consisting of two spin states interacting through an S-wave scattering length. The rf transition rate has a high-frequency tail that is proportional to the contact and displays logarithmic scaling violations, decreasing asymptotically like $1/(\omega^2 \ln^2 \omega)$. Its coefficient is proportional to $\ln^2(a'_{2D}/a_{2D})$, where a_{2D} and a'_{2D} are the 2-dimensional scattering lengths associated with initial-state and final-state interactions. The clock shift is proportional to the contact and to $\ln(a'_{2D}/a_{2D})$. If $|\ln(a'_{2D}/a_{2D})| \gg 1$, the clock shift arises as a cancellation between much larger contributions proportional to $\ln^2(a'_{2D}/a_{2D})$ from bound-bound and bound-free rf transitions.

[1]Army Research Office and Air Force Office of Scientific Research and DFG

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