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Ramping Fermions in Optical Lattices across a Feshbach resonance ANIELLO ESPOSITO, HELMUT G. KATZGRABER, MATTHIAS TROYER, Theoretische Physik, ETH Zurich — We study the properties of ultracold Fermi gases in a three-dimensional optical lattice when crossing a Feshbach resonance. By using a zero-temperature formalism, we show that three-body processes are enhanced in a lattice system in comparison to the continuum case. This poses one possible explanation for the short molecule lifetimes found when decreasing the magnetic field across a Feshbach resonance. Effects of finite temperatures on the molecule formation rates are also discussed by computing the fraction of double-occupied sites. Our results show that current experiments are performed at temperatures considerably higher than expected: lower temperatures are required for fermionic systems to be used as quantum simulators. In addition, by relating the double occupancy of the lattice to the temperature, we provide a means for thermometry in fermionic lattice systems, previously not accessible experimentally. The effects of ramping a filled lowest band across a Feshbach resonance when increasing the magnetic field are also discussed: fermions are lifted into higher bands due to entanglement of Bloch states. Our results are in good agreement with recent experiments.

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