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Lattice Thermodynamics for Ultra-Cold Atoms DAVID MCKAY, BRIAN DEMARCO, University of Illinois at Urbana-Champaign — We report measurements on the temperature of ultra-cold ^{87}Rb gases transferred into an optical lattice and compare to non-interacting thermodynamics for a combined lattice–parabolic potential. Absolute temperature is determined at low temperature by fitting quasi-momentum distributions obtained using bandmapping, i.e., turning off the lattice potential slowly compared with the bandgap. We show that distributions obtained at high temperature employing this technique are not quasimomentum distributions through numerical simulations. To overcome this limitation, we extract temperature using the in-trap size of the gas.

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