Abstract Submitted for the MAR10 Meeting of The American Physical Society

Probing the Kondo Lattice Model with Alkaline Earth Atoms¹ MICHAEL FEIG, MICHAEL HERMELE, VICTOR GURARIE, University of Colorado Boulder, ANA MARIA REY, JILA, NIST — It has recently been proposed that alkaline-earth atoms can be used to simulate condensed matter Hamiltonians with both spin and orbital electronic degrees of freedom [1]. For example, it is possible to create two independent optical lattices for trapping the ${}^{1}S_{0}$ and ${}^{3}P_{0}$ clock states, which we then associate with two orbital degrees of freedom [2]. Such a system is particularly well suited to simulation of the Kondo Lattice Model (KLM): by placing one clock state in a deep lattice and the other in a shallow lattice it is possible to mimic the interaction of localized spins with a band of conduction electrons. We suggest simple dynamical probes of the KLM phase diagram that can be implemented with current experimental techniques. In particular, we show how Kondo physics at strong coupling, low density, and in the heavy fermion phase is manifest in the dipole oscillations of the conduction band upon sudden displacement of a parabolic trapping potential. [1] A. V Gorshkov et al. arXiv:0905.2610v2 [condmat.quant-gas], Jan 2009. [2] A Daley, M Boyd, J Ye, and P Zoller. Phys. Rev. Lett. 101, 170504 (2008).

¹This work was supported by grants from the NSF.

Michael Feig University of Colorado Boulder

Date submitted: 18 Nov 2009

Electronic form version 1.4