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Magic Traps for Clock Transitions in Neutral Cesium Atoms ALEXANDER CARR, MARK SAFFMAN, Univ of Wisconsin, Madison — In a system of trapped atoms errors in quantum gates and precision spectroscopy can arise from a differential shift in atomic transitions caused by gradients in the electric and magnetic fields. The thermal motion of an atom in a trap allows it to sample changes in these two fields resulting in a constantly shifting transition frequency. "Magic" traps minimize this source of noise by finding experimental conditions where the first-order sensitivity to gradients is nulled. We present refinements to calculations of the Zeeman and A.C. Stark Shift for qubit states in the ground hyperfine state manifold of neutral Cesium atoms. We follow this with a discussion of implications for traps insensitive to electric fields, magnetic fields or both simultaneously.

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