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Atom Number Measurements in a Strong Light-Assisted Collision Regime MATTHEW EBERT, MICHAEL GIBBONS, ALEX GILL, XIANLI ZHANG, MARK SAFFMAN, THAD WALKER, University of Wisconsin - Madison
— We present a method for measuring small numbers of cold Rb atoms trapped in a FORT, in a regime of strong light-assisted collisions. Knowing the mean number of detected photons for a single atom, the light-assisted collisional loss rate is obtained by fitting a two-body loss rate model to the camera signal measured at different exposure times. The photon number from a short camera exposure can be used to estimate, either on a shot-by-shot basis or for a collection of shots, the number of atoms in the trap. The method presented improves our ability to characterize and minimize systematic errors that can degrade the fidelity of our deterministic single atom loading using the Rydberg blockade protocol. This work is supported by the NSF and the AFOSR Quantum Memories MURI.

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