Abstract Submitted
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**Tomographic characterization of an atom trapping potential**[1] EDWARD MOAN, TANWA ARPORNTHIP, CHARLES SACKETT, UVA — We have developed a technique to fully characterize the potential profile of an arbitrary atom trap. A cold atom cloud is loaded into a weakly-confined time-orbiting potential (TOP) trap. The atoms are optically pumped into a dark state, an energy level that does not interact with the probe laser light. A cross-sectional region of the atom cloud is reactivated by a "sheet" of repump light that optically pumps the atoms back into the probed energy state. The repump light sheet is roughly 100 $\mu$m thick. The reactivated region interacts with the probe laser light to create a fluorescence image. Since the light sheet is much thinner than the 2 mm-wide atom cloud, the fluorescence image obtained is a cross-section of the atom cloud. A movable light sheet allows us to generate cross-section images of the cloud at different positions. A composite image of all the cross-section images shows the complete density profile of the atom trap. This is similar to tomographic imaging used in medical imaging. From the density profile, the potential energy function can be obtained, assuming the atoms are in equilibrium. We have verified the technique with various other benchmarks, viz. direct oscillation measurements, trajectory analysis, and numerical simulation of the atom trap.

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