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In situ sensing of position and temperature of a single trapped atom via resonance fluorescence RICHARD WAGNER, WES ERICKSON, DAN STECK, University of Oregon — Temperature measurements of ultra-cold atoms have either required releasing of the atomic cloud or have taken advantage of relatively weak confining forces to observe center-of-mass motion of the cloud. However, tight confinement forces required for single-atom trapping limit temperature measurements to destructive release-recapture methods. We present an alternative temperature measurement for single atoms in a MOT. A small oscillation in the magnetic field of a MOT imprints a position-dependent oscillation in the fluorescence of a single atom. Measuring this fluorescence oscillation provides information about the spatial distribution of the atom in the trap, and therefore its temperature. This is done without the need to release the atom, allowing for additional experiments on the atom with a known temperature.

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