Non-destructive state measurement of individual neutral atoms
MICHAEL GIBBONS, CHUNG-YU SHIH, CHRIS HAMLEY, MICHAEL CHAP-MAN, Georgia Institute of Technology — Non-destructive state detection of individual neutral atoms is essential for scalable neutral atom quantum information processing. We have demonstrated non-destructive fluorescent state detection of individual neutral atom qubits trapped in an optical lattice. The hyperfine state of the atom is measured with 95% accuracy and the atom loss rate of 1%. State detection is performed on individual atoms over 100 times before being lost from the trap, representing a significant increase in the data collection rates. Using this technique, we have observed microwave Rabi oscillations with measurements done on one-and-the-same atom.