Abstract Submitted
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Spatially imaging single atoms in a 3D optical lattice[1] KARL D. NELSON, XIAO LI, DAVID S. WEISS, Penn State University — We have built a 3D far-off-resonance optical lattice with 4.5 μm spacing. We load $\sim$6 atoms per site in the lattice. During cooling, photon-assisted interactions cause atom loss in pairs, until a random half of the central 500 sites are occupied by single atoms. We image the 3D pattern of atoms, one plane at a time, using high-numerical-aperture optics. Since the image is formed with the laser cooling light, and the steady state average energy of the atoms is well below the lattice depth, the process of identifying which sites are occupied and which are not does not change the atom locations. Atoms in this site-addressable optical lattice are promising qubits.

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