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Addressing single atoms in a 3D optical lattice[1] XIAO LI, TED CORCOVILOS, YANG WANG, Penn State, JUNGSANG KIM, Duke University, AQT, DAVID S. WEISS, Penn State — We will describe an experiment to address single Cs atoms tightly trapped in a 3D optical lattice with 5 micron spacing. Two intersecting perpendicular, 2.7 micron waist, 880-nm lasers beams impose an ac-Stark shift on the energy levels of a single target atom that is about twice as large as the shift imposed on any other atom. This allows us to drive microwave transitions that are only resonant for the target atom. The positions of the addressing beams are controlled dynamically by two electrostatically-actuated MEMS mirrors, which allow any atom within a 5×5×5 array to be targeted within tens of microseconds. Such single site addressing will allow for controlled arbitrary filling of the lattice and will constitute the single qubit gate operation for quantum computing.

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