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Scalable neutral atom quantum computing with MEMS micromirrors CALEB KNOERNSCHILD, Duke University, FELIX LU, HOON RYU, Applied Quantum Technologies, MICHAEL FENG, JUNGSANG KIM, Duke University, DUKE UNIVERSITY COLLABORATION, APPLIED QUANTUM TECHNOLOGIES COLLABORATION — In order to realize a useful atom-based quantum computer, a means to efficiently distribute critical laser resources to multiple trap locations is essential. Optical micro-electromechanical systems (MEMS) can provide the scalability, flexibility, and stability needed to help bridge the gap between fundamental demonstrations of quantum gates to large scale quantum computing of multiple qubits. Using controllable, broadband micromirrors, an arbitrary atom in a 1, 2, or 3 dimensional optical lattice can be addressed with a single laser source. It is straightforward to scale this base system to address n arbitrary set of atoms simultaneously using n laser sources. We explore on-demand addressability of individual atoms trapped in a 1D lattice, as well as investigate the effect the micromirrors have on the laser beam quality and phase stability.

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