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Optical MEMS Based Beam Steering for 2D lattice[1] CALEB KNOERNSCHILD, CHANGSOON KIM, FELIX LU, BIN LIU, JUNGSANG KIM —
Most scalable quantum computation approaches using arrays of trapped ions or individual neutral atoms in optical lattices require the experimental capability to address individual qubits in the large array. It is difficult to achieve such flexibility with traditional optical systems utilizing bulky components aligned on optical tables. Optical micro-electromechanical systems (MEMS) technology can provide a flexible and scalable solution for this functionality. We have developed simple beam steering optics using controllable MEMS mirrors that enable one laser beam to address multiple qubit locations in a linear trap or 2D trap lattice. The system can individually address 25 different positions on a 5 x 5 square array. MEMS mirror settling times of $< 5\mu$s were demonstrated which allow for fast access time between qubits. Characterization of beam quality and optical power throughput is also presented. This system has the advantage of providing multiple individually addressed spots of different colors simultaneously without any frequency shifts.

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