

Abstract Submitted  
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**Realization of individual addressing on two-dimensional ion crystal using MEMS mirror**<sup>1</sup> ZHENGYANG CAI, MU QIAO, CHUNYANG LUAN, PENGFEI WANG, KIHWAN KIM, Tsinghua University, CENTER FOR QUANTUM INFORMATION, INSTITUTE FOR INTERDISCIPLINARY INFORMATION SCIENCES TEAM — Individual manipulation of qubits is the essential element for universal quantum computation and quantum simulation. The technology of individual quantum operation on qubits can be realized by individually addressing laser beams with the capability of independent control for trapped ion quantum computation. Recently, two-dimensional (2D) crystal of ions has been developed for the quantum computation and simulation [1]. However, the ability of individual and independent control of ion-qubits is still missing. In this work, we present the design and simulation results of an optical setup to generate an arbitrary two-dimensional pattern of laser beams using a MEMS mirror array. We fabricate the MEMS mirror array into a customized ceramic pin grid array (CPGA) base and seal it with rare gas. The flipping angle of the MEMS mirrors are controlled by a high-accuracy digital-analog-convert (DAC). Finally, the aberration and beam pattern are studied with CCD camera. [1] Wang, Ye et al. Realization of two-dimensional crystal of ions in a monolithic Paul trap. (2019).

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