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**Experimental realization of real-time feedback-control of single-atom arrays**[1] HYOSUB KIM, WOOJUN LEE, JAEWOOK AHN, Department of Physics, KAIST — Deterministic loading of neutral atoms on particular locations has remained a challenging problem. Here we show, in a proof-of-principle experimental demonstration, that such deterministic loading can be achieved by rearrangement of atoms. In the experiment, cold rubidium atom were trapped by optical tweezers, which are the hologram images made by a liquid-crystal spatial light modulator (LC-SLM). After the initial occupancy was identified, the hologram was actively controlled to rearrange the captured atoms on to unfilled sites. For this, we developed a new flicker-free hologram algorithm that enables holographic atom translation. Our demonstration show that up to N=9 atoms were simultaneously moved in the 2D plane with the movable degrees of freedom of 2N=18 and the fidelity of 99% for single-atom 5-$\mu$m translation. It is hoped that our in situ atom rearrangement becomes useful in scaling quantum computers.

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