

## **An atom-by-atom assembler of defect-free arbitrary two-dimensional atomic arrays**

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**Reference:**

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**URL:**

<http://science.sciencemag.org/content/354/6315/1021/tab-pdf> [2]

Large arrays of individually controlled atoms trapped in optical tweezers are a very promising platform for quantum engineering applications. However, to date, only disordered arrays have been demonstrated, due to the non-deterministic loading of the traps. Here, we demonstrate the preparation of fully loaded, two-dimensional arrays of up to 50 microtraps each containing a single atom, and arranged in arbitrary geometries. Starting from initially larger, half-filled matrices of randomly loaded traps, we obtain user-defined target arrays at unit filling. This is achieved with a real-time control system and a moving optical tweezers that performs a sequence of rapid atom moves depending on the initial distribution of the atoms in the arrays. These results open exciting prospects for quantum engineering with neutral atoms in tunable geometries.

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