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**Quantum Gas Microscope – A Next Generation Quantum Simulator**

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Ultracold atoms give the unique opportunity to experimentally realize and study increasingly complex many-body quantum systems. One approach is to employ large samples of ultracold atoms and, for example, carry out quantum simulations of condensed-matter models. The opposite approach is to assemble quantum information systems with full control over all degrees of freedom, atom by atom, ion by ion. I will present work in which we have created a quantum gas microscope that bridges between these two worlds. Thousands of individual atoms are detected with near-unity fidelity on individual sites of a Hubbard regime optical lattice. In addition, the single site addressability can be used for creating arbitrary potential landscapes and for local atom manipulation. This novel approach opens many new possibilities for quantum simulations and quantum information applications.