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Quantum Simulation and Computation with Neutral Atoms

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The last few years have seen a remarkable development in our ability to control many neutral atoms individually, and induce controlled interactions between them on demand. This progress ushers in a new era where one can create highly entangled states, or study quantum phase transitions. I will present results on atomic arrays containing more than 250 atoms, including transport of entangled states, and the generation of topological surface- and toric-code states. Finally, I will discuss prospects for near- and medium-term quantum computers with full quantum error correction.

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