Exploring New Frontiers of Quantum Science Using Programmable Atom Arrays

M Lukin[1]

[1]*Department of Physics, Harvard University, Cambridge MA, USA*
Contact Email: lukin@physics.harvard.edu

We will discuss the recent advances involving programmable, coherent manipulation of quantum systems based on neutral atom arrays excited into Rydberg states, allowing the control over several hundred qubits in two dimensions. Recent developments involving both analog and digital quantum simulations and quantum information processing will be described. In particular, the realization of novel quantum processing architecture based on dynamically reconfigurable entanglement and the steps towards quantum error correction will be discussed. Finally, we will discuss opportunities for realization of useful, large-scale quantum processors.