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Progress Toward the Development of Neutral Atom Quantum Computing Architecture Based on 2D Optical Lattices on a Chip RAJANI AYACHITULA, Ohio State University, KATHARINA CHRISTANDL, Ohio State University, Kenyon College, MICHAEL CHMUTOV, GREGORY LAFYATIS, Ohio State University — We have shown, theoretically, that optical lattices can be created above an optical waveguide by destructively interfering two different, co-propagating waveguide modes of laser light that is blue-detuned from an atomic resonance [1]. Single atoms can be tightly trapped at the nodes of the lattice and can serve as individually addressable qubits in a quantum memory. We have studied the polarization of light about these nodes for possible Zeeman substate-dependent trapping. We have also examined the prospects for moving the atoms within the lattice and entangling atom pairs to eventually realize one- and two-qubit gates. We present experimental progress in realizing the optical lattice architecture. 1. Phys. Rev. A 70 032302 (2004)

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