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Nanophotonic cavity QED with individually trapped atoms TAMARA DORDEVIC, POLNOP SAMUTPRAPHOOT, HANNES BERNIEN, PALOMA OCOLA, SYLVAIN SCHWARTZ, Department of Physics, Harvard University, VLADAN VULETIC, Department of Physics, MIT, CRYSTAL SENKO, Department of Physics and Astronomy, University of Waterloo, MIKHAIL LUKIN, Department of Physics, Harvard University — The realization of strong interactions between single photons and single atoms is a central theme in quantum optics and an essential prerequisite for future quantum applications such as quantum networks. We achieve such interactions by using a hybrid approach in which we couple individually trapped atoms to nanophotonic crystal cavities [1]. Here we present our methods for trapping and cooling two atoms near a nanophotonic cavity and our progress towards preparing anentangled state of two atoms mediated by the cavity photons. Our experiment aims at demonstrating scalable and efficient quantum gates [2] with applications in integrated quantum networks. [1] J. D. Thompson, T. G. Tiecke, N. P. de Leon, J. Feist, A. V. Akimov, M. Gullans, A. S. Zibrov, V. Vuleti, and M. D. Lukin, Science 340, 1202 (2013) [2] T. G. Tiecke, J. D. Thompson, N. P. de Leon, L. R. Liu, V. Vuletic and M. D. Lukin, Nature 508, 241 (2014)

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