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Nanophotonic cavity QED with individually trapped atoms PALOMA OCOLA, TAMARA DORDEVIC, POLNOP SAMUTPRAPHOOT, HANNES BERNIEN, Harvard University, CRYSTAL SENKO, University of Waterloo, SYLVAIN SCHWARTZ, ALEXANDER ZIBROV, Harvard University, VLADAN VULETIC, MIT, MIKHAIL LUKIN, Harvard University — The realization of strong atom-photon interactions is a central theme in quantum optics and an essential prerequisite for future quantum applications. We achieve such interactions using a hybrid system of neutral atoms and optical photons coupled via a nanoscale photonic crystal waveguide cavity [1]. Here, we demonstrate strong coupling between the cavity and two individual atoms trapped in optical tweezers. Our experimental effort aims at creating entangled states between two atoms using interactions mediated by cavity photons–a cornerstone for building scalable quantum gates [2]. [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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