## Abstract Submitted for the MAR13 Meeting of The American Physical Society

Nonlocal transport in superconducting oxide nanostructures<sup>1</sup> JOSHUA VEAZEY, GUANGLEI CHENG, SHICHENG LU, MICHELLE TOM-CZYK, PATRICK IRVIN, MENGCHEN HUANG, University of Pittsburgh, CHUNG WUNG BARK, SANGWOO RYU, CHANG-BEOM EOM, University of Wisconsin-Madison, JEREMY LEVY, University of Pittsburgh — We report nonlocal transport signatures in the superconducting state of nanostructures formed<sup>2</sup> at the LaAlO<sub>3</sub>/SrTiO<sub>3</sub> interface using conductive AFM lithography. Nonlocal resistances (nonlocal voltage divided by current) are as large as 200  $\Omega$  when 2-10  $\mu$ m separate the current-carrying segments from the voltage-sensing leads. The nonlocal resistance reverses sign at the local critical current of the superconducting state. Features observed in the nonlocal V-I curves evolve with back gate voltage and magnetic field, and are correlated with the local four-terminal V-I curves. We discuss how nonlocal and local transport effects in LaAlO<sub>3</sub>/SrTiO<sub>3</sub> nanostructures may result from the electronic phase separation and superconducting inhomogeneity reported by others in planar structures<sup>3</sup>.

 $^1{\rm This}$  work is supported by AFOSR (FA9550-10-1-0524) and NSF DMR-0906443  $^2{\rm J.P.}$  Veazey, et al., arXiv:1210.3606 (2012).

<sup>3</sup>Ariando, et al., Nature Comm. **2**, 188 (2011); J.A. Bert, et al., Nature Phys. **7**, 767 (2011).

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Date submitted: 09 Nov 2012

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