Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Pascal Liquid Phase in Electronic Waveguides[1] M. TOMCZYK, M. BRIGGEMAN, A. TYLAN-TYLER, M. HUANG, B. TIAN, D. PEKKER, Univ. of Pittsburgh, J.-W. LEE, H. LEE, C.-B. EOM, Univ. of Wisconsin-Madison, J. LEVY, Univ. of Pittsburgh — Clean one-dimensional electron transport has been observed in very few material systems. The development of exceptionally clean electron waveguides formed at the interface between complex oxides $LaAlO_3$ and $SrTiO_3$ enables low-dimensional transport to be explored with newfound flexibility. This material system not only supports ballistic 1D transport[2], but possesses a rich phase diagram and strong attractive electron-electron interactions[3] which are not present in other solid-state systems. Here we report an unusual phenomenon in which quantized conductance increases by steps that themselves increase sequentially in multiples of e^2/h. The overall conductance exhibits a Pascal-like sequence: 1, 3, 6, 10... e^2/h, which we ascribe to ballistic transport of 1, 2, 3, 4 ... bunches of electrons. We will discuss how subband degeneracies can occur in non-interacting models that have carefully tuned parameters. Strong attractive interactions are required, however, for these subbands to lock together. This Pascal liquid phase provides a striking example of the consequences of strong attractive interactions in low-dimensional environments.

[1]We gratefully acknowledge financial support from AFOSR (FA9550-12-1- 0057 (JL) and FA9550-12-1-0342 (CBE)), ONR N00014-15-1-2847 (JL), and NSF DMR-1234096 (CBE)
[2]M. Tomczyk *et al.*, PRL **117**, 096801 (2016)
[3]G. Cheng *et al.*, Nature **521**, 196 (2015)

Michelle Tomczyk
Univ. of Pittsburgh

Date submitted: 11 Nov 2016 Electronic form version 1.4