Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Probing the charge-vortex duality near the superfluid-to-insulator transition SNIR GAZIT, DANIEL PODOLSKY, ASSA AUERBACH, Technion - Israel Institute of Technology — We study the charge vortex duality near the superfluid-to-insulator quantum phase transition in d=2+1 dimensions. We use a generalized reciprocity relation between charge and vortex conductivities at complex frequencies to identify the capacitance in the insulating phase as a measure of vortex condensate stiffness. We then compute the ratio of boson superfluid stiffness to vortex condensate stiffness at mirror points to be 0.21(1). This corroborates and provides a quantitative measure to the non self-dual nature of the charge-vortex duality. We further study deviations from self-duality at finite frequency by computing the product of Matsubara frequency conductivities at mirror points across the phase transition. Finally, we propose experimental realizations that test our predictions in THz spectroscopy of disordered superconductors and cold atomic systems trapped in an optical lattice. [1] S. Gazit, D. Podolsky, A. Auerbach, arXiv:1407.1055 (2014)

Snir Gazit
Univ of California - Berkeley

Date submitted: 14 Nov 2014 Electronic form version 1.4