

Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

The quasi-normal modes of quantum criticality¹ WILLIAM WITCZAK-KREMPA, Perimeter Institute, SUBIR SACHDEV, Harvard University — We study the general features of charge transport of quantum critical points described by CFTs in 2+1D. We use an effective field theory on an asymptotically AdS spacetime, expanded to fourth order in spatial and temporal gradients. The presence of a horizon at non-zero temperatures implies that this theory has quasi-normal modes with complex frequencies. The quasi-normal modes determine the poles and zeros of the conductivity in the complex frequency plane, and so fully determine its behavior on the real frequency axis, at frequencies both smaller and larger than the temperature. We describe the role of particle-vortex or S-duality on the conductivity, specifically how it maps poles to zeros and vice versa. These analyses motivate two sum rules obeyed by the quantum critical conductivity. Finally, we compare our results with the analytic structure of the $O(N)$ model in the large- N limit, and other CFTs.

¹Supported by Walter Sumner Foundation, NSF, ARO.

William Witzak-Krempa
Perimeter Institute

Date submitted: 28 Oct 2012

Electronic form version 1.4