Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Optical Conductivity in Holography with Hyperscaling Violation and Massive Gravity BRANDON LANGLEY, PHILIP PHILLIPS, University of Illinois at Urbana-Champaign — One of the long-standing enigmas in the field of strongly-interacting electron systems is the mid-frequency power law form of the optical conductivity in the cuprates, $|\sigma| \sim \omega^{-\alpha}$. Many efforts have been put forth to obtain this power law using the AdS/CFT correspondence while maintaining the experimentally observed Drude form of the conductivity at low frequency. Some models have obtained the power law form over a very narrow range but none have matched the robust form lasting over decades as in experimental observations. We expand on previous constructions by introducing the dynamical exponent z and hyperscaling parameter θ in a theory that breaks translational invariance using massive gravity. We seek a form of the optical conductivity that reproduces the functional form of the cuprates over all frequency regimes.

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Date submitted: 06 Nov 2015 Electronic form version 1.4