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A Holographic Model for Quantum Critical Responses

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In this talk we construct a self-consistent holographic model that is used to analyze the dynamical response functions for strongly interacting quantum critical systems described by conformal field theories (CFTs). A relevant scalar operator is incorporated in order to drive a quantum critical phase transition and we study the effect that our model parameters have on the finite temperature conductivity, most notably, the scaling dimension of the relevant operator. We find that the conductivity is well-approximated by a simple ansatz proposed by Katz et al [Physical Review B 90 (24), 245109]. At large frequencies, we expand the conductivity using the operator product expansion to reveal the spectrum of our model CFT. Finally, our model can be used to analyze the conductivity as we tune away from the quantum critical point, allowing for a comprehensive analysis of the phase diagram.

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