

Abstract Submitted
for the SES11 Meeting of
The American Physical Society

Holographic Real-Time Finite-Temperature 3-Point Correlators and Their Applications on Second Order Hydrodynamics CHAOLUN WU, DIANA VAMAN, PETER ARNOLD, University of Virginia, EDWIN BARNES, University of Maryland, WEI XIAO, University of Virginia — We built up a complete real-time prescription for calculating n -point correlators of finite-temperature conformal field theory operators using holography. We found it amounts to integrating only the right quadrant of the black hole, and then adapting the finite temperature analog of Veltman's circling rules to gravity tree-level diagrams to calculate correlators. We constructed a complete mapping between the real-time finite-temperature field theory and its real-time dual supergravity description. We subjected our prescription to several checks. We gave, for the first time, concrete formulas for all real-time 3-point correlators. We applied the above to study second order hydrodynamics in 4-d conformal field theories. We derived Kubo relations for second order transport coefficients in terms of 3-point stress tensor retarded correlators. For $N=4$ super Yang-Mills theory at strong coupling and finite temperature we computed these stress tensor 3-point correlators using AdS/CFT. The small momentum expansion of the 3-point correlators in terms of transport coefficients is matched with AdS result and the coefficients are retrieved consistently. Our method allows for a unified treatment of hydrodynamic coefficients and can be systematically generalized to higher order hydrodynamics.

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Date submitted: 24 Aug 2011

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