Contribution ID : **98**   Type : **not specified**

Holographic thermal correlators from recursions

Saturday, 30 November 2024 15:40 (30)

We calculate holographic thermal correlators using a recurrence relation of $\{a_n\}$ at $n \to \infty$, building on recent advances in the connection formula for the Heun equation. We consider two gravitational solutions that correspond to distinct states in different subsectors of $\mathcal{N} = 4$ super-Yang-Mills theory at finite temperature and density. The first solution is the Reissner-Nordstr\"{o}m-AdS$_5$ black hole, which has finite entropy at zero temperature. The second solution is a charged dilatonic black hole in AdS$_5$, which has zero entropy at zero temperature. In both cases, we perturb the system with a charged scalar field and express the perturbation equation in terms of the Heun equation. We find interesting moving patterns of the poles of the correlators. We discuss the relation between the recurrence relation and the Virasoro conformal block as two equivalent approaches to write the connection formula for the Heun equation.

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Session Classification : Day1 Main venue