

Institut Henri Poincaré
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String Theory in Greater Paris

Rencontres Théoriciennes
“Supergravité, théorie des cordes et théorie M”

Jeudi 25 Mars 2021, 11:00

Blaise Goutéraux

Ecole Polytechnique

Hydrodynamic diffusion and its breakdown near AdS₂ fixed points

Hydrodynamics provides a universal description of interacting quantum field theories at sufficiently long times and wavelengths, but breaks down at scales dependent on microscopic details of the theory. We use gauge-gravity duality to investigate the breakdown of diffusive hydrodynamics in two low temperature states dual to black holes with AdS₂ horizons. We find that the breakdown is characterized by a collision between the diffusive pole of the retarded Green's function with a pole associated to the AdS₂ region of the geometry, such that the local equilibration time is set by infra-red properties of the theory. The absolute values of the frequency and wavevector at the collision (ω_{eq} and k_{eq}) provide a natural characterization of all the low temperature diffusivities D of the states via $D = \omega_{eq}/k_{eq}^2$ where $\omega_{eq} = 2\pi\Delta T$ is set by the temperature T and the scaling dimension Δ of an infra-red operator. We confirm that these relations are also satisfied in an SYK chain model in the limit of strong interactions.

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