

Strange metal and quantum gravity

We discuss how strange metals arise from the spatially random Yukawa-SYK model based on the wormhole which is defined as a mechanism for long range interaction without distant dependent suppression.

It provides a mechanism of the planckian dissipation, because momentum delivery is possible over arbitrary distance without suppression. Our wormhole connect particles while the that of the quantum gravity connect underlying spacetime.

The presence of such non-local interaction tells us that SYK-like models show strongly correlated behavior even in the small coupling case.

Based on the equivalence of the quenched and annealed averages large- N limit, we show that it provides a field theory version of the ER=EPR.

We also discuss why disorder based model can give a state where quantum entanglement is important.

We argue that system with spatially random coupling involves no information loss while spatially uniform coupling experiences decoherence, so that strange metalicity is based on the quantum entanglement rather than the decoherence.