

## The 189th HENPIC seminar by Dr. Weiyao Ke

Title: An extend range of sound dominance in the quark-gluon plasma

Abstract: The quark-gluon plasma (QGP) is a hot and dense state of matter governed by quantum chromodynamics (QCD). Like many other QCD systems, QGP displays different properties when probed at different scales. At long wavelengths (small gradients), phenomenological evidence suggests that it is a nearly perfect liquid; while at short distances, one expects to resolve quarks and gluons in the plasma. However, we know little about how the dynamics transit from hydrodynamic to microscopic excitations in the intermediate region. Recently, we noticed that in both weakly-coupled and strongly-coupled proxy theories of the QGP, sound dominance of the response persists at large wave numbers, way beyond the traditional hydrodynamic region. I will demonstrate how the Muller-Israel-Stewart hydrodynamics can be extended to describe such “sound dominance” at large gradients in the linear response limit. Finally, I will discuss possible phenomenological applications and implications.

### Summary