



The 189th HENPIC seminar

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

Speaker: Dr. Weiyao Ke (柯伟尧)

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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.

ABOUT THE SPEAKER:

Dr. Weiyao Ke completed his undergraduate study at Peking University in 2014, and obtained his PhD from Duke University in the Fall of 2019, developing transport theory of heavy quarks and statistical analysis for heavy-ion collisions. After graduation, he joined UC Berkeley/LBNL as a postdoc working on jet quenching physics. Since the Fall of 2021, he has been a Director's Postdoc Fellow at LANL, researching jet tomography in hot and cold nuclear matter.



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