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A New Approach to First-Order Relativistic Hydrodynamics

Monday 11 January 2021 19:20 (20 minutes)

In this talk we explain how the novel first-order approach proposed by Bemfica, Disconzi, Noronha [1], and Kovtun [2] naturally solved the long-standing problems of causality, stability, and well-posedness of relativistic Navier-Stokes theory. We discuss the differences between this new approach and Israel-Stewart theory, emphasizing how such distinctions could affect our current understanding of the hydrodynamic evolution of the quark-gluon plasma. We also explain how to derive this hydrodynamic approach from kinetic theory using a new coarse-graining method that is different from the well-known Chapman-Enskog expansion and the method of moments. Finally, we discuss how this new first-order theory emerges at strong coupling using holography.

[1] F. S. Bemfica, M. M. Disconzi, J. Noronha, Phys. Rev. D 98 (2018) 10, 104064; Phys. Rev. D 100 (2019) 10, 104020; and arxiv e-Print: 2009.11388.

[2] P. Kovtun, JHEP 10 (2019) 034; R. E. Hoult, P. Kovtun, JHEP 06 (2020) 067.

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