Contribution ID: **58**

Type: **talk**

Fast Hydrodynamization of Non-conformal Holographic Shockwaves

Monday, 26 June 2017 16:30 (25 minutes)

Ever since fast hydrodynamization has been observed in heavy ion collisions the understanding of the early out-of-equilibrium stage of such collisions has been a topic of intense research. We use the gauge/gravity duality to model the creation of a strongly coupled Quark-Gluon plasma in a non-conformal gauge theory. This numerical relativity study is the first non-conformal holographic simulation of a heavy ion collision and reveals the existence of new relaxation channels due to the presence of non-vanishing bulk viscosity. We study collisions at different energies in gauge theories with different degrees of non-conformality and compare three relaxation times which can occur in different orderings: the hydrodynamization time (when hydrodynamics becomes applicable), the EoSization time (when the average pressure approaches its equilibrium value) and the condensate relaxation time (when the expectation value of a scalar operator approaches its equilibrium value). We find that these processes can occur in several different orderings. Finally, I will discuss a new example of the applicability of hydrodynamics to systems with large gradients. We show that the time evolution and saturation of the spinodal instability (corresponding to black branes afflicted by the Gregory-Laflamme instability in the gravity dual) are accurately described by second-order hydrodynamics, where a set of locally unstable states with a first-order thermal phase transition settle down to a static, inhomogeneous configuration.

Primary authors: Prof. MATEOS, David (University of Barcelona); Dr CASALDERREY SOLANA, Jorge (University of Oxford); ATTEMS, Maximilian (University of Barcelona); Mr TRIANA, Miquel (University of Barcelona); Dr BEA, Yago (University of Barcelona); Dr MIGUEL, Zilhao (University of Barcelona)

Presenter: ATTEMS, Maximilian (University of Barcelona)