Weak vs. strong coupling non-equilibrium dynamics in an expanding universe

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In this seminar I will show how recent developments in kinetic theory and in the gauge/gravity duality have shed new light onto the out-of equilibrium dynamics of interacting systems in an expanding universe. On the kinetic theory side, I will show how one can obtain an exact analytical solution of the Boltzmann equation for an expanding gas in a Friedmann-Lemaitre-Robertson-Walker (FLRW) universe. On the gauge/gravity duality side, I will argue that the commonly used hydrodynamic expansion in strongly interacting (non-conformal) gauge theories has zero radius of convergence. This can be shown to be the case analytically for strongly coupled $N = 2^*$ supersymmetric gauge theory in a FLRW universe.