Troels Harmark

Abstract: The Hagedorn temperature is a source of continuing fascination and insight into thermal physics of strings and gauge theories. Originally proposed in QCD, the exponential growth of states associated to the Hagedorn temperature was later found to be a feature of string theory as well. The deeper reason for this shared feature is now seen as a consequence of the duality between gauge and string theories, as made precise by the AdS/CFT correspondence. We review how one can employ integrability to find the Hagedorn temperature of N=4 SYM, giving access to the strong coupling regime by a numerical calculation. Amazingly, this makes it possible to connect the string theory side of the correspondence. On the string side, recent progress has revealed that the Hagedorn temperature can be computed as a winding mode along a thermal circle. We propose a curvature-corrected thermal scalar equation of motion, which captures corrections to the Hagedorn temperature on curved backgrounds. This is tested on both pp-wave and AdS backgrounds.

Jácome (Jay) Armas

I'll discuss the effective theory of hydrodynamics for classes of thermal driven open systems that have not yet received considerable attention from a high-energy perspective. These systems have weakly broken time-translation symmetry and host thermostated (two-temperature) steady states which are time independent states that constantly produce entropy. They lead to violations of conventional properties of typical systems studied in holography such as the fluctuation-dissipation theorem. I will discuss the various applications and interesting connections with non-equilibrium physics.

Luca Iliesiu:

Abstract: I will describe the dynamical evolution of a universe containing a single black hole. If the black hole has sufficiently large initial charge, it will be driven very close to extremality by the emission of neutral Hawking radiation, while charged particle emission is exponentially suppressed. At low enough temperatures, quantum gravity becomes important and Hawking-style quantum field theory in curved spacetime calculations give completely incorrect answers, even for simple questions like the energy spectrum of emitted radiation. This leads to interesting new physics, e.g. in certain regimes the dominant radiation channel becomes entangled pairs of photons, as in the "forbidden'' 2s->1s hydrogen atom transition. By careful analysis of the relevant metric fluctuations, we can calculate the quantum gravity effects in a controlled manner and tell the complete story of the black hole evaporation in both a universe with a matter content similar to ours and in a supersymmetric universe described by supergravity.

Rodolfo Russo

Abstract: In holographic CFT's, such as N=4 SYM, it is natural to organise the spectrum in single and multi particle states. By now we have a wealth of information about 4-point correlators with BPS single particle states, but very little is known about 4-point correlators involving multi particle states. I will discuss how we can calculate such correlators at strong coupling focusing in particular on a bulk approach based on 1/2-BPS asymptotically AdS supergravity solutions. I will provide some explicit examples of correlators with multi-particle states both in AdS3 and AdS5.

The results involve a natural generalisation of the D-functions appearing in the 4-point correlators with single particle states at strong coupling.

Justin David

Abstract: The $O(N)$ vector model with a quartic interaction in 3 dimensions is one of the most well studied quantum field theories. It is important to describe strongly correlated physics and its non-trivial fixed point at large N serves as the holographic dual to Vasiliev's higher spin theory on AdS_4. In spite of the extensive studies, there is no systematic study of the model on $S^1\times S^2$. We develop a method to evaluate the partition function and energy density of a massive scalar on a 2-sphere of radius r and at finite temperature β as power series in β/r. Each term in the power series can be written in terms of polylogarithms. We use this result to obtain the gap equation for the large N, critical $O(N)$ model in the large radius expansion. Solving the gap equation perturbatively we obtain the leading finite size corrections to thermal one-point functions in the model. This includes one-point functions of the higher spin, $s>2$ currents of the model for which we use the Euclidean inversion formula. The talk will also review the relevance of one point functions in holography and summarize earlier results.