MP 3: AdS/CFT I

Zeit: Dienstag 8:30–10:25 Raum: SFG 2010

Hauptvortrag MP 3.1 Di 8:30 SFG 2010

Applications of gauge/gravity duality: The example of magnetic impurities — •Johanna Erdmenger — Institut für Theoretische Physik und Astrophysik, Julius-Maximilians-Universität Würzburg, Am Hubland, 97074 Würzburg

Gauge/gravity duality, or holography, provides new relations between strongly coupled quantum field theories and gravity. In addition to its intrinsic interest in relation to quantum gravity, gauge/gravity duality also provides novel approaches to studying strongly coupled systems in a wide range of areas within physics.

We illustrate this approach using a recent holographic model for a localized magnetic impurity interacting with a strongly coupled quantum field theory, in generalization of the Kondo model. We calculate the entanglement and impurity entropies and show that they agree with field theory expectations. We also study quantum quenches, which are determined by the complex eigenmodes of the gravity system. The two-point functions for this model display Fano resonances originating from the interplay between a continuum of states and a localized resonance.

[1] J. Erdmenger, C. Hoyos, A. O'Bannon, I. Papadimitriou, J. Probst, J. M. S. Wu: Holographic Kondo and Fano Resonances. arXiv:1611.09368 [hep-th]. [2] J. Erdmenger, M. Flory, C. Hoyos, M.-N. Newrzella, J. M. S. Wu: Entanglement Entropy in a Holographic Kondo Model. Fortsch.Phys. 64 (2016) 109-130 [3] J. Erdmenger, C. Hoyos, A. O'Bannon, J. M. S. Wu: A Holographic Model of the Kondo Effect. JHEP 1312 (2013) 086.

10 min. break

MP 3.2 Di 9:25 SFG 2010

Quantum Quenches in a Holographic Kondo Model — Johanna Erdmenger[1,2], Mario Flory[1,3], •Max-Niklas Newrzella[1], Migael Strydom[1], and Jackson M.S. Wu[4] — [1]Max-Planck-Institut für Physik (Werner-Heisenberg-Institut), Föhringer Ring 6, 80805, Munich, Germany — [2]Institut für Theoretische Physik und Astrophysik, Julius-Maximilians-Universität Würzburg, Am Hubland, 97074 Würzburg, Germany — [3]Institute of Physics, Jagiellonian University, Lojasiewicza 11, 30-348 Kraków, Poland — [4]Department of Physics and Astronomy, University of Alabama, Tuscaloosa, AL 35487, USA

We apply gauge/gravity duality to study the non-equilibrium dynamics induced by quenching the interaction parameter between a magnetic impurity and a strongly coupled system of fermions. In the holographic limit, this model exhibits a phase transition at a critical temperature, below which the impurity is partially screened. We investigate the quasinormal modes in both phases, and comment on the dynamical critical behaviour at around the critical point.

MP 3.3 Di 9:45 SFG 2010

Non-local observables at finite temperature in AdS/CFT — •Nina Miekley[1,2] and Johanna Erdmenger[1,2] — [1]Julius-Maximilians-Universität Würzburg, Germany — [2]Max-Planck-Institut für Physik, München, Germany

The AdS/CFT correspondence relates strongly coupled field theories to theories containing gravity. One interesting aspect are non-local observables, for instance the two-point function, the Wilson loop and the entanglement entropy. Their dual descriptions are associated to minimal surfaces.

The aforementioned observables are known in the form of power-series for d-dimensional Schwarzschild-AdS. Starting from this result, we derive their closed, analytic form. This simplified form allows deeper insights into the behaviour of these non-local observables.

MP 3.4 Di 10:05 SFG 2010

Vaidya and Holography in the far from Equilibrium Regime — •Michael Florian Wondrak[1,2], Matthias Kaminski[3], Piero Nicolini[1,2], and Marcus Bleicher[1,2] — [1]Frankfurt Institute for Advanced Studies (FIAS), Frankfurt am Main, Germany — [2]Institut für Theoretische Physik, Johann Wolfgang Goethe-Universität Frankfurt, Frankfurt am Main, Germany — [3]Department of Physics and Astronomy, University of Alabama, Tuscaloosa, USA

The so-called gauge/gravity duality provides a link between gravitational and quantum physics, more specifically between quantities in an asymptotic Anti-de Sitter spacetime and its dual conformal field theory on the boundary (AdS/CFT correspondence). The duality can be used to obtain observables in a strongly coupled system by addressing the analogous problem in the associated weakly curved gravitational theory.

This correpondence turned out to be a successful means to calculate transport coefficients of (non-)conformal field theories, which for example lead to a prediction of the low shear viscosity over entropy density ratio later measured in heavy ion collisions. Near equilibrium quantities are typically derived from perturbations of static gravitational background geometries. In order to study far from equilibrium properties on the field theory side, we work with a generalized time-dependent Vaidya background on the gravity side: A black brane which grows due to the collapse of infalling null matter in the presence of electromagnetic fields. This can find application, e.g., in the description of heavy ion collisions.