MP 8: AdS/CFT II

Zeit: Mittwoch 9:00–10:35 Raum: SFG 2010

Hauptvortrag MP 8.1 Mi 9:00 SFG 2010

Applications of AdS/CFT: From quantum critical theories to entanglement and spacetime — •Martin Ammon — Theoretisch-Physikalisches Institut,Friedrich-Schiller-Universität Jena

Gauge/Gravity Duality - also referred to as AdS/CFT correspondence or just holography - is an attractive new concept originating from string theory. On one hand, it sheds new light on quantum gravity, while on the other, it provides tools for studying strongly coupled systems in a variety of areas in physics. These include particle, heavy ion and condensed matter physics.

After a short introduction into the basic building blocks of the AdS/CFT correspondence I sketch two exciting applications: (1) topological phases within strongly coupled quantum field theories using holography as well as (2) entanglement entropy and its relation to spacetime geometry within string theory.

10 min. break

MP 8.2 Mi 9:55 SFG 2010

Phase diagrams of holographic superfluids at finite superfluid velocity — Martin Ammon and •Markus Gardemann — Theoretisch-Physikalisches Institut, Friedrich-Schiller-Universität Jena, 07743 Jena, Germany

The AdS/CFT correspondence is a novel approach to strongly coupled field theories. With this tool we examine the phase diagram of a particular superfluid at finite superfluid velocity. In particular we study the Goldstone modes arising due to spontaneous symmetry breaking. Within the model the sound velocity becomes negative for large enough superfluid velocity signalling an instability. Since the instability is strongest at finite wavelength, this indicates the existence of an inhomogeneous or striped condensed phase for large superfluid velocity. We explicitly construct the striped phase and extract some of the thermodynamic properties.

MP 8.3 Mi 10:15 SFG 2010

Holographic quenches and anomalous transport — Martin Ammon[1], •Sebastian Grieninger[1], Amadeo Jiménez-Alba[1], Rodrigo P. Macedo[1], and Luis Melgar[2] — [1]Theoretisch-Physikalisches Institut, Friedrich-Schiller-Universität Jena, 07743 Jena, Germany — [2]Blackett Laboratory, Imperial College London, SW7 2AZ, U.K.

We study the response of the chiral magnetic effect due to continuous quenches induced by time dependent electric fields within holography. Holography is a novel tool to study strongly coupled field theories, i. e. their non equilibrium properties. Concretely, we consider a holographic model with dual chiral anomaly and compute the electric current parallel to a constant, homogeneous magnetic field and a time dependent electric field in the probe approximation. We explicitly solve the PDEs by means of pseudospectral methods in spatial and time directions and study the transition to an universal "fast" quench response. We highlight the existence of Landau level resonances in the electrical conductivity parallel to a magnetic field at finite frequency and show explicitly that these only appear in presence of the anomaly. We show that the existence of these resonances induces, among others, a long-lived AC electric current once the electric field is switched off.