

MP 3: Particle Physics and AdS/CFT

Time: Tuesday 16:15–17:35

Location: ZHG001

MP 3.1 Tue 16:15 ZHG001

An Effective Hadronic Field Theory for B-Meson Decays at Large Recoil — ●JACK JENKINS, THORSTEN FELDMANN, and JAIME DEL PALACIO LIROLA — University of Siegen

We construct an effective hadron Lagrangian for heavy-meson decays into light energetic particles. In this theory the dynamical degrees of freedom are given by quasi-static heavy meson fields coupled to soft and collinear pions, kaons and eta mesons. We give a few examples of how weak-decay operators in soft-collinear effective theory can be represented in the effective hadronic Lagrangian, and discuss potential phenomenological applications.

MP 3.2 Tue 16:35 ZHG001

Composite Higgs models and the AdS/CFT Correspondence — JOHANNA ERDMENGER, WERNER POROD, and ●DEEPALI SINGH — Julius-Maximilians-Universität Würzburg, Germany

Symmetry groups and their representations play a crucial role in understanding fundamental physics, from particle phenomenology to holographic duality. Symmetries have also given us an insight into solving issues like the hierarchy problem. One such example is the framework of Composite Higgs models which addresses the hierarchy problem by interpreting the Higgs boson as a pseudo-Nambu-Goldstone boson arising from a global symmetry breaking. We will discuss how AdS/CFT offers powerful tools to study Composite Higgs scenarios by leveraging the duality between strongly coupled gauge theories and weakly coupled gravitational theories in one higher dimension. In particular, we will consider models in which the global group $SU(4) \times SU(4)$ gets broken to the diagonal $SU(4)$. We will use gauge/gravity duality to calculate the spectrum of bosonic bound states emerging in Composite Higgs models.

MP 3.3 Tue 16:55 ZHG001

Quasi-static time evolution of the speed of sound and sound

attenuation in Bjorken expanding holographic plasma — ●MATTHIAS KAMINSKI¹, JUN ZHANG¹, DURDANA ILYAS¹, MARCO KNIPFER², and CASEY CARTWRIGHT³ — ¹University of Alabama, Tuscaloosa, AL, U.S.A. — ²FAU Erlangen-Nurnberg, Erlangen, Germany — ³Utrecht University, Utrecht, Netherlands

The speed of sound is a key parameter for characterizing equilibrium states, but sound waves also propagate through media far from equilibrium, such as the quark-gluon plasma created in heavy-ion collisions. Using $\mathcal{N} = 4$ Super-Yang-Mills theory as a toy model, this study numerically explores the time evolution of the speed and attenuation of sound modes in a plasma undergoing a Bjorken expansion after being prepared in a far-from-equilibrium state. These results provide new insights into the dynamic properties of sound modes in anisotropic and rapidly evolving plasma systems.

MP 3.4 Tue 17:15 ZHG001

Three-dimensional gravity as Kodaira-Spencer theory — JOHANNA ERDMENGER, JONATHAN KARL, JANI KASTIKAINEN, RENÉ MEYER, and ●HENRI SCHEPPACH — Institut für Theoretische Physik und Astrophysik, Julius-Maximilians-Universität Würzburg, D-97074 Würzburg, Germany

Twisted holography provides a promising framework for exploring holographic dualities beyond the strict large N limit. However, a formulation of the duality in the traditional form is lacking. In this talk, I will present a construction to identify degrees of freedom of three-dimensional gravity in six-dimensional Kodaira-Spencer (KS) theory, featuring prominently in twisted holography. The construction works by embedding solutions of 3D gravity with a negative cosmological constant into a 6D manifold whose complex structure solves the KS equations of motion. This allows us to apply the well-understood holographic dictionary for 3D gravity and 2D conformal field theories to twisted holography. Furthermore, the construction allows for an embedding of black hole geometries into KS theory.