The Galileo Galilei Institute for Theoretical Physics
Arcetri, Florence

New Developments in AdS3/CFT2 Holography

Mar 20, 2017 - May 12, 2017

Aims of this workshop:

- To review recent progress in AdS3 /CFT2
- To assemble a critical mass of leading International researchers in order to stimulate collaboration and inspire new developments
- To contribute to the research training of young researchers in Italy, Europe and world-wide

Topics:

- Gauged LSM
- Two-dimensional conformal field theories
- Black holes
- Four-dimensional instantons
- Higher-spin symmetries
- Integrability

Two of the key problems of modern theories of fundamental interactions are the understanding of strongly coupled gauge theories and quantum gravity. Holographic duality, through the celebrated work of Maldacena, connects these two seemingly very different problems; it does so via a strong/weak correspondence, making it possible to infer the behavior of strongly coupled gauge theory from a weakly coupled theory of gravity and vice versa. This striking conjecture has fundamentally reshaped the way we think of gauge and gravity theories in the quantum regime. A quantitative description of gauge/string duals with little or no supersymmetry would likely lead to a much better understanding of strongly coupled phenomena such as confinement or black-hole entropy, making their study an important goal of the community. However, a quantitative framework of generic dualities remains very ambitious. Instead, it may be useful to identify examples which have interesting dynamical behaviour that also retain some simplifying features that allow for a quantitative analysis.

The AdS3 /CFT2 duality is an ideal toy-model for such investigations. Since it has a relatively small amount of supersymmetry (half of the maximally supersymmetric AdS5 /CFT4 example) it allows for a rich dynamics. At the same time, AdS3 /CFT2 plays an important role in a variety of diverse problems in theoretical physics including the strong-coupling dynamics of two-dimensional gauge theories, dynamics of three-dimensional black holes, quantum instanton moduli space of four-dimensional gauge theory, microscopic entropy counting in five-dimensional black-holes, higher-spin spin symmetries and integrable models, to name but a few. As a result, there are a number of approaches to understanding this duality, each with its own set of tools.

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