

Cours de physique théorique de Saclay

Vendredi 17/11/2023, 10:00

Orme des Merisiers Salle Claude Itzykson, Bât. 774

The string worldsheet approach to AdS₃/CFT₂

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Strings propagating in AdS₃ with pure Neveu-Schwarz flux can be described in terms of a world-sheet theory, which is believed to be solvable. This provides a framework where we can study the holographic duality with unprecedented precision. Nevertheless, since the target space is Lorentzian and non-compact, the corresponding WZW model has highly unusual features, which render the computation of correlators involving the so-called spectrally flowed states quite complicated.

In this course we will review the basic aspects of this model and discuss the modern approach to these issues, based on the theory of holomorphic covering maps. This has led to a series of important new results, unveiling the precise mechanisms at work behind this particular instance of the AdS₃/CFT₂ correspondence. The limit of tensionless strings is of particular interest in this context as both sides of the duality are under exact control.

Lectures I-III:

Strings in AdS₃. Spectrum, partition function and correlators. Basics of Wess-Zumino-Witten models. SU(2) as a prototypical example. SL(2,R) WZW model, H₃⁺ model and Liouville theory. Geometric aspects and semiclassical considerations. Representation theory for SL(2,R). The role of spectral flow. Vertex operators for short and long strings. Spectrally flowed correlators, local Ward identities and recursion relations. The y-basis, holomorphic covering maps, and the computation of flowed three-point functions. Conjecture for four-point functions and proposal for the holographic theory.

Lecture IV:

Superstrings in AdS₃×S³×T⁴ and tensionless strings. Super-WZW model. Symmetry algebra and chiral primaries. Computation of protected correlators and comparison with the symmetric orbifold results. The tensionless limit: hybrid formalism, spectrum and correlators. Localization properties and exact duality.

Lecture V:

Further applications. Gauged WZW models. Applications to black holes and their microstates, holography beyond AdS, little string theory, and the single-trace TT̄ deformations of the holographic CFT.

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