20 Curricular Unit

Advanced Physics Topics 1

Module

Introduction to gauge/gravity duality

Type

Lectures and Reading and Study assignment

Contact hours

18

Professor/Researcher in charge

Joao Penedones (EPFL); Contact Professor: Miguel Costa U. Porto

Summary of Contents

1. Conformal field theory review: conformal transformations, local operators, ward identities, state-operator map, operator product expansion, conformal bootstrap, embedding space formalism, large N factorization.

2. Anti-de Sitter spacetime: particle dynamics in AdS, quantum field theory on AdS, state-operator map, generating function, gravity with AdS boundary conditions.

3. The AdS/CFT correspondence: quantum gravity as CFT, string theory, finite temperature, applications, open problems.

References

J. McGreevy, “Holographic duality with a view toward many-body physics,” Adv.High Energy Phys. 2010 (2010) 723105, arXiv:0909.0518 [hep-th].
S. A. Hartnoll, “Lectures on holographic methods for condensed matter physics,” Class.Quant.Grav. 26 (2009) 224002, arXiv:0903.3246 [hep-th].
O. Aharony, S. S. Gubser, J. M. Maldacena, H. Ooguri, and Y. Oz, “Large N field theories, string theory and gravity,” Phys.Rept. 323 (2000) 183–386, arXiv:hep-th/9905111 [hep-th].
E. D’Hoker and D. Z. Freedman, “Supersymmetric gauge theories and the AdS / CFT correspondence,” arXiv:hep-th/0201253 [hep-th].

Evaluation

Problems solved and presented by the students during the course.

Juri

Miguel Costa, João Penedones (EPFL), João Rosa