

INSTITUTO DE FÍSICA - USP

Disciplina do Curso de Pós-Graduação

2° Semestre de 2017

NOME DA DISCIPLINA:

INTRODUCTION TO THE ADS/CFT CORRESPONDENCE

Obrigatória? SIM () NÃO (x)

PROFESSOR RESPONSÁVEL: **Prof. Diego Trancanelli**

<u>CARGA HORÁRIA:</u>	SEMANAL
Aulas Formais.....	___ 04 ___
Aulas práticas, seminários e/ou outras atividades programadas	___ 00 ___
Horas de estudo	___ 02 ___

ATIVIDADES DISCENTES: Início: October 2017 Término: November 2017

NÚMERO DE CRÉDITOS: 06

DURAÇÃO: 8 weeks

PRÉ-REQUISITOS:

Introdução à Teoria Quântica de Campos I (PGF5107).

This course is going to be as much self-contained as possible and will not require previous exposure to string theory. Some familiarity with quantum field theory and general relativity will be assumed.

PROGRAMA:

1. Basics of string theory
2. Supersymmetry and supersymmetric gauge theories
3. The geometry of Anti de Sitter space
4. The AdS/CFT correspondence
5. Basic checks
6. Correlation functions, anomalies, Wilson loops
7. Holographic renormalization
8. Examples of the correspondence (M(atric) theory, ABJM, etc.)
9. Brief introduction to integrability
10. Conformal symmetry breaking
11. Back holes and thermal aspects
12. Applications to strongly coupled systems

BIBLIOGRAFIA:

Notes and original articles.

H. Nastase “Introduction to the AdS/CFT correspondence” Cambridge Univ. Press

CRITÉRIO DE AVALIAÇÃO DO APROVEITAMENTO:

Homework lists and final presentations.

NÚMERO MÁXIMO DE ALUNOS: -x-

OBJETIVOS:

This course will provide students with an introduction to various aspects of the AdS/CFT correspondence, giving them the tools to understand research articles and to start doing research in this field.

JUSTIFICATIVA:

The *gauge/gravity duality* (also called *gauge/string duality* or *AdS/CFT correspondence*) is an explicit realization of the holographic principle. Inspired by black hole thermodynamics, this principle states that string theory, which is a theory of quantum gravity, has a dual description in terms of a quantum field theory (with no gravity) defined on the boundary of the space where the strings live. The most notable incarnation of this principle is the so-called “Anti de Sitter/Conformal Field Theory correspondence” (AdS/CFT) proposed by Juan Maldacena in 1997. This has been one of the groundbreaking developments in theoretical physics in the last two decades; it has truly revolutionized our research field and opened many new avenues of investigation.

The utility of the AdS/CFT correspondence is that one can often use one description rather than the other for computing interesting physical observables and questions on one side of the duality can be reformulated in the language of the other side. In fact, the two descriptions, the gauge theory and the gravity or string description, are complementary to each other, so that problems which are difficult to study in one picture are often easy to study in the dual picture, and vice-versa.