

Introduction to Conformal Field Theory

Course number: PHY668A.

Instructor: Arjun Bagchi.

Prerequisites: Group theory, Statistical mechanics, Quantum Field Theory 1.

Course contents:

S. No.	Topics	Details
1	Introduction	Renormalisation group flows in QFTs and the advent of CFTs
2	Global Conformal Invariance	CFTs in general dimensions. Representation theory, correlation functions.
3	Conformal invariance in 2d	Infinite enhancement of symmetry in $d=2$. Virasoro algebra and its many consequences.
4	Operator formalism	Use of complex analysis for 2d CFTs. Operator Product Expansions. Energy- momentum tensor and Virasoro algebra.
5	Minimal models	Simplest models of 2d CFT.
6	Modular Invariance	2d CFT on the torus. Partition functions. Cardy formula for entropy.
7.	Generalizations	CFTs with additional symmetry (Kac-Moody algebras), Supersymmetric CFTs.
8.	Further generalizations	Non-relativistic CFTs, Logarithmic CFTs.
9.	Applications to Stat Mech	Use of CFTs in critical phenomena
10.	Towards holography	Asymptotic analysis in AdS3 and AdS3/CFT2

Recommended books:

1. Conformal Field Theory: Di Francesco, Matheiu, Senechal.
2. Introduction to Conformal Field Theory: Blumenhagen, Plauschinn.
3. Conformal Field Theory: Ketov.