Institut de physique théorique

Unité de recherche du CEA, associée au CNRS

Cours de physique théorique

agréé par l'École doctorale de physique de la région parisienne - ED 107

Conformal field theory in two dimensions

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Les vendredis 8, 15, 29 novembre et 6, 13 décembre 2013 à 10h, et le 22 novembre à 14h

We provide an introduction to conformal field theory on the two-dimensional plane, using the conformal bootstrap formalism: the main ideas, their technical implementation, and their application to simple models such as Liouville theory and Minimal Models.

We begin with an explanation of the bootstrap method in quantum field theory. We then focus on two-dimensional theories with local conformal symmetry, encoded in the Virasoro algebra. We sketch the consequences of conformal symmetry on the structure of conformal field theories, in particular on their spectrum, and discuss the role of the central charge.

In order to derive the consequences of these ideas in more detail, we study the highest-weight representations of the Virasoro algebra. This leads to Ward identities and null vector equations for correlation functions, and to the determination of Operator Product Expansions. When we interpret the Virasoro algebra as the algebra of conformal transformations, these equations become differential equations, and in a special case their solution is given by a hypergeometric function.

Using these technical results, we define and solve Liouville theory – a fundamental conformal field theory with a continuous spectrum. From Liouville theory we deduce the solutions of Generalized Minimal Models and A-series Minimal Models, after defining these models by certain assumptions on their spectrums, such as discreteness and closure under fusion.

If time allows, we will finally apply the conformal bootstrap method to theories with affine symmetries, starting with free bosonic theories.

Lieu: *IPhT, CEA Saclay, Orme des Merisiers, Bât. 774, porte 1A Salle C. Itzykson*
Accès: *Navettes CEA du RER B Le Guichet vers CEA Ormes, toutes les 15 minutes de 8h à 9h45 ou bus publics Mobicaps 9 et 10, Albatrans 91.06 et 91.10*
Renseignements: `http://ipht.cea.fr` *ou* `ipht-lectures@cea.fr`

(Mise à jour affiche: 2013-09-24)