

Cours de physique théorique de Saclay

Vendredi 30/09/2022, 10:00-12:31

Orme des Merisiers Salle Claude Itzykson, Bât. 774

Introduction to Topological Recursion

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Videoconference: subscribe to the course newsletter to receive links

Abstract:

Topological Recursion is a mathematical tool. From an initial data S , called the spectral curve, the recursion produces a sequence $\omega_{g,n}(S)$ indexed by two integers g,n . These sequences have many applications that range from string theory to random matrices, statistical physics on a random lattice, integrable systems, WKB asymptotics, CFT, ... We shall introduce Topological Recursion by examples and concrete applications, and mention some long-reach issues.

Plan:

- 1) Introduction by examples of spectral curves: random matrix spectral densities (semi-circle $y = \sqrt{1-x^2}$), the Witten-Kontsevich curve ($y = \sqrt{x}$), and the Mirzakhani's curve ($y = \sin \sqrt{x}$), and their applications, in particular the volumes of the space of hyperbolic surfaces, the Mirzakhani's recursion.
- 2) Going from examples to general Topological Recursion. Practical methods for computing Topological Recursion, in particular graphical methods, and general properties.
- 3) Link to the geometry of surfaces: moduli space of Riemann surfaces, cohomological field theories, towards string theory.
- 4) Topological Recursion as a powerful method to compute WKB series. Link to differential equations and integrable systems.

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