SEMPARIS – Séminaires en région parisienne

http://string.lpthe.jussieu.fr/semparis/

Cours

Vendredi 7 Octobre 2022, 09:01 IPHT, Salle Claude Itzykson, Bât. 774

Domaines: physics

Titre: Introduction to Topological Recursion

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Résumé : Video conference : 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.