SEMPARIS – Séminaires en région parisienne

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Cours

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

Titre : *Introduction to Topological Recursion*

Orateur : **Bertrand Eynard (IPhT)**

Résumé : *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.