

SEMPARIS – Séminaires en région parisienne

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

Cours

Vendredi 21 Octobre 2022, 10 :00

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.*
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