

Rencontre IPhT (CEA-Saclay) - IHÉS

Le 18 mars 2010

Organisateurs: Jean Pierre Bourguignon (IHÉS), Henri Orland (IPhT), Pierre Vanhove (IPhT & IHÉS)

Les exposés se dérouleront au Centre de conférence Marilyn et James Simons (IHÉS)

Programme

9:15 -- 9:30	Yves Caristan (Directeur de la DSM et du centre CEA de Saclay)
9:30 -- 9:50	Alain Connes (IHÉS) <i>Le modèle spectral</i>
9:50 -- 10:10	David Kosower (IPhT) <i>Next-to-Leading Order Collider Physics with Multiple Jets</i>
10:10 - - 10:30	Ruth Britto (IPhT) <i>Scattering amplitudes in gauge theories</i>
10:30 - - 10:50	Pierre Vanhove (IHÉS & IPhT) <i>Simplicity of gauge and gravity amplitudes</i>
10:50 - - 11:20	Coffee break
11:20 - - 11:40	Dirk Kreimer (IHÉS) <i>Kinematics and Cohomology</i>
11:40 - - 12:00	Bertrand Duplantier (IPhT) <i>A Rigorous Perspective on Liouville Quantum Gravity and KPZ</i>
12:00 - - 12:20	Vincent Pasquier (IPhT) <i>Instabilités dans de Sitter</i>
12:20 - - 12:40	Thibault Damour (IHÉS) <i>E_{10} and M-theory</i>
12:40 - - 14:00	Buffet

14:00 -- 14:20	Mikhail Gromov (IHÉS) <i>Secret Mathematical Life of Micelles and Liposomes</i>
14:20 -- 14:40	Henri Orland (IPhT) <i>Classification topologique des ARN</i>
14:40 -- 15:00	Christophe Soulé (IHÉS) <i>Sur le rôle des circuits dans les réseaux de gènes</i>
15:00 -- 15:20	Kirone Mallick (IPhT) <i>Exact results for a model in nonequilibrium statistical physics</i>
15:20 -- 15:40	Michel Bauer (IPhT) <i>Quelques questions ouvertes sur les interfaces en deux dimensions</i>
15:40 -- 16:10	Coffee break
16:10 -- 16:30	Thomas Garel (IPhT) <i>Statistics of renormalized hoppings for Anderson localization transitions</i>
16:30 -- 16:50	Guilio Biroli (IPhT) <i>The glass transition</i>
16:50 -- 17:10	Ivan Kostov (IPhT) <i>Matrix models and conformal field theories</i>
17:10 -- 17:30	Maxim Kontsevich (IHÉS) <i>From holomorphic dynamics to lattice models</i>
17:30 -- 17:50	Clément Ruef (IPhT) <i>Black holes in string theory: What's new?</i>
17:50 -- 18:10	Jean Pierre Bourguignon (IHÉS) <i>La courbure de Ricci comme principe organisateur</i>
18:10 -- 18:30	Jérémie Bouttier (IPhT) <i>Distance in random planar maps</i>
18:30 -- 18:50	André Voros (IPhT) <i>(Generalized) zeta functions over zeros of zeta functions</i>

Intervenant

Titre

Michel Bauer
IPhT

Quelques questions ouvertes sur les interfaces en deux dimensions
Grâce une percée spectaculaire due aux mathématiciens au début du millénaire, de nombreuses propriétés des interfaces dans les systèmes critiques bidimensionnels sont bien comprises. En revanche, presque rien n'est connu sur les interfaces non-critiques. Je montrerai aussi qu'il reste beaucoup à découvrir sur les liens entre les modèles discrets critiques et leur limite continue.

Guilio Biroli
IPhT

The glass transition
The glass transition is one of the great unsolved problems of statistical and condensed matter physics. We will describe the physical phenomenon, the main open questions and present some of the theoretical approaches.

Jean Pierre Bourguignon
IHÉS

La courbure de Ricci comme principe organisateur

Ruth Britto
IPhT

Scattering amplitudes in gauge theories
Scattering amplitudes in gauge theories such as supersymmetric Yang–Mills theory and QCD take remarkably simple forms. This simplicity is a clue that the perturbative theory is best understood without reference to Feynman diagrams. In fact, it has recently become possible to understand some of the simplicity and derive amplitudes directly and elegantly. Current approaches involve exploring singular behavior and seeking clues in so-called twistor geometry, with applications in searches for new physics in high-energy particle colliders.

Jérémie Bouttier
IPhT

Distance in random planar maps

Alain Connes
IHÉS & Collège de France

Le modèle spectral

Thibault Damour
IHÉS

E_{10} and M-theory

Bertrand Duplantier
IPhT

A Rigorous Perspective on Liouville Quantum Gravity and KPZ
(joint work with Scott Sheffield, MIT)
Liouville quantum gravity in two dimensions is described by the "random Riemannian manifold" obtained by changing the Lebesgue measure dz in the plane by a random conformal factor $\exp[\gamma h(z)]$, where $h(z)$ is a random function called the Gaussian Free Field, and γ a parameter.
This "random surface" is believed to be the continuum scaling limit of certain discretized random surfaces that can be studied with combinatorics and random matrix theory.
A famous formula, due to Knizhnik, Polyakov and Zamolodchikov in '88, relates standard critical exponents in the Euclidean plane to their counterparts on the random surfaces mentioned above. We describe a recent proof of the KPZ formula in the probabilistic setting given above.

Thomas Garel
IPhT

Statistics of renormalized hoppings for Anderson localization transitions
We use an exact real space renormalization transformation due to Aoki (1980) for the (one electron) Anderson tight-binding model in $d=2,3$. We study numerically the statistical properties of on-site energies and hoppings as a function of the system size L . This procedure can be applied to a model of interacting spinless fermions, where Aoki's transformation is performed in configuration space. Our results point towards a many-body localization transition, which has some similarity with the one electron localization transition on the Cayley tree.
(travail en collaboration avec C. Monthus, IPhT)

Mikhail Gromov
IHÉS

Secret Mathematical Life of Micelles and Liposomes

Maxim Kontsevich
IHÉS

From holomorphic dynamics to lattice models

David Kosower
IPhT

Next-to-Leading Order Collider Physics with Multiple Jets

Ivan Kostov
IPhT

Matrix models and conformal field theories

Dirk Kreimer
IHÉS

Kinematics and Cohomology

Kirone Mallick
IPhT

Exact results for a model in nonequilibrium statistical physics
The asymmetric simple exclusion process can be solved exactly using integrability techniques borrowed from the theory of quantum integrable systems such as the Bethe Ansatz and the Matrix Product Representation. This model can be used as a template to study various aspects of nonequilibrium statistical physics.

Vincent Pasquier
IPhT

Instabilités dans de Sitter
La quantification dans les espaces courbes pose des problèmes nouveaux. Sur la sphère de de Sitter, la notion même d'état asymptotique est mal définie. Nous présenterons le premier ordre de la théorie de perturbation qui décrit la désintégration d'une particule de masse m en deux masses m' et m'' .
Travail en collaboration avec Ugo Moschella, Henri Epstein, Jacques Bros et Michel Gaudin

Henri Orland
IPhT

Classification topologique des ARN
On montre comment le genre topologique peut-être utilisé pour classifier les repliements d'ARN, ainsi que pour les prédire. On montrera aussi le lien de la mécanique statistique des ARN avec les théories de champs de matrices.

Clément Ruef
IPhT

Black holes in string theory: What's new?
In this talk, I will review some recent results in the context of black holes in string theory. Some concerns the entropy counting from a microscopic point of view, and some are about new black hole or black hole microstate solution.

Christophe Soulé
IHÉS

Sur le rôle des circuits dans les réseaux de gènes

Pierre Vanhove
IHÉS & IPhT

Simplicity of gauge and gravity amplitudes
Using monodromy relations in string theory one can derive the existence of a minimal basis for amplitude in QCD and gravity at tree-level. The existence of such basis has important consequences in the unitarity based approach for higher-loop amplitudes

André Voros
IPhT

(Generalized) zeta functions over zeros of zeta functions
We survey generalized zeta functions (in three kinds) built over the nontrivial zeros of the Riemann zeta function, and their numerous explicit properties which have barely been displayed in the past literature. One application is a sharp asymptotic criterion for the Riemann Hypothesis.