



Session CIV

## Stochastic processes and random matrices

July 6-31, 2015

<http://lptms.u-psud.fr/workshop/randmat/>

### Organizing committee

Alexander Altland  
Yan Fyodorov  
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Mathematics Institute, University of Warwick, Great-Britain  
Laboratoire de Physique Théorique et Modèles Statistiques, CNRS, Université Paris-Sud, France

### Long Courses

Alexei Borodin (Massachusetts Institute of Technology)  
Alice Guionnet (Massachusetts Institute of Technology)  
Pierre Le Doussal (CNRS, Ecole Normale Supérieure, Paris)  
Satya Majumdar (CNRS, Université Paris-Sud, Orsay)  
Herbert Spohn (Universität München)  
Bálint Virág (University of Toronto)

Integrability and the Kardar-Parisi-Zhang universality class  
An introduction to free probability  
Replicas, renormalization and integrability in random systems  
Recent applications of random matrices in statistical physics  
The Kardar-Parisi-Zhang equation – a statistical physics perspective  
 $\beta$ -ensembles and random Schrödinger operators

### Short Courses

Jean-Philippe Bouchaud (CFM, Ecole Polytechnique)  
Alain Comtet (Université P. et M. Curie, Paris VI)  
Bertrand Eynard (Commissariat à l'énergie atomique, Saclay)  
Jonathan Keating (School of Mathematics, University of Bristol)  
Gernot Akemann (Universität Bielefeld)  
Aris Moustakas (University of Athens)  
Henning Schomerus (Lancaster University)  
Vincent Vargas (CNRS, Ecole Normale Supérieure, Paris)  
Hans Weidenmüller (Universität Heidelberg)  
Anton Zabrodin (ITEP, Moscow)

Random matrix theory and (big) data analysis  
Schrödinger operators in random potentials  
Topological recursion in random matrices and combinatorics of maps  
Random matrix theory and number theory  
Matrix models and quantum chromo-dynamics  
Random matrix theory methods for telecommunication systems  
Random matrix theory approaches to open quantum systems  
Gaussian multiplicative chaos and Liouville quantum gravity  
Historical overview: random matrix theory and its applications  
Some aspects of integrability and quantum-classical correspondence

### Scientific Program

The connections between stochastic processes and random matrix theory (RMT) have been a rapidly evolving subject during the last ten years where the continuous development of new tools has led to an avalanche of new results. The most emblematic example of such successful connections is provided by the theory of growth phenomena in the Kardar-Parisi-Zhang (KPZ) universality class. Other important instances include non-intersecting Brownian motions or processes governed by "1/f" noise, which are at the heart of disordered systems exhibiting a freezing transition. These breakthroughs have been made possible thanks, to a large extent, to the recent development of various new techniques in RMT. The goal of the school thus is to present the state of the art concepts of the field, with a special emphasis on the large spectrum of techniques and applications of RMT. Finally an important aspect of this school is that the topic of stochastic processes and RMT is at the interface of statistical physics and mathematics. Therefore this school aims at bringing together students (and researchers) from both communities.

### Registration

Applications must reach the School before March 1, 2015 in order to be considered by the selection committee. The full cost per participant, including housing, meals and the book of lecture notes, is 1500€ (we should be able to provide financial aid to a limited number of students). All information and application form can be found directly on Les Houches website: <http://houches.ujf-grenoble.fr/>.

One can also contact the School at

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Les Houches is a village located in Chamonix valley, in the French Alps. Established in 1951, the Physics School is situated at 1150m above sea level in natural surroundings, with breathtaking view on the Mont-Blanc range. A quiet place, ideal for intellectual activity.

Les Houches Physics School is affiliated with Université Joseph Fourier and Institut National Polytechnique de Grenoble, and is supported by the Ministère de l'Education Nationale et de la Recherche, the Centre National de la Recherche Scientifique (CNRS), the Direction des Sciences de la Matière du Commissariat à l'Energie Atomique (CEA/DSM).