

JOURNÉES DE PHYSIQUE STATISTIQUE

Paris – Thursday January 30 & Friday January 31, 2025

Welcome to the 44th edition of the “Journées de Physique Statistique”.

Communications were, as far as possible, grouped by topics.

The duration of short talks is **5 minutes** altogether (4 minutes for the talk itself + 1 minute for questions). Please avoid presenting more than two or three slides.

The preferred language is **English**.

We thank the FRIF, the Laboratoire Interdisciplinaire de Physique, and the Université Paris-Cité for their support.

Organization team:

Cécile Cottin-Bizonne (Univ. Lyon I / CNRS)

Leticia Cugliandolo (Sorbonne Université)

Vivien Lecomte (Univ. Grenoble-Alpes / CNRS)

Leonardo Mazza (Univ. Paris-Saclay)

Adam Nahum (ENS Paris)

Frédéric van Wijland (Univ. de Paris / CNRS)



PROGRAMME

Thursday January 30, 2025

8h30 - 9h00	Registration
9h00 - 10h30	Série A (Chair: Frédéric van Wijland)
10h30 - 11h00	Pause
11h00 - 11h30	Lydéric Bocquet (LPENS, Paris) <i>Flows in nanochannels, from ionic memory to quantum plumbing</i>
11h30 - 12h00	Frédéric Caupin (ILM, Université Claude Bernard, Lyon) <i>Liquid polyamorphism: phenomenology, a minimal model, and the case of water</i>
12h00 - 13h50	Lunch time
13h50 - 15h00	Série B (Chair: Leonardo Mazza)
15h00 - 15h30	Pause
15h30 - 16h00	Giulio Biroli (LPENS, Paris) <i>Generative AI and Diffusion Models: a Statistical Physics Approach</i>
16h00 - 16h30	Alain Barrat (Centre de Physique Théorique, Marseille) <i>Propagation patterns of contagion processes on networks and hypernetworks</i>
16h30 - 17h00	Pause
17h00 - 18h20	Série B – continued (Chair: Vivien Lecomte)
18h20 - 19h40	Apéritif / dinner (offered upon subscription)
19h40 - 20h10	Raphaël Voituriez (LPTMC, Sorbone-Université, Paris) <i>Emerging memory effects in random walk models of cell migration</i>
20h10 - 21h00	Série B – night session (Chair: Cécile Cottin-Bizonne)

Friday January 31, 2025

- 9h00 - 10h50** **Série C** (Chair: Leticia Cugliandolo)
- 10h50 - 11h20** Pause
- 11h20 - 11h50** **Cécile Repellin (LPMMC, Université Grenoble-Alpes)**
Probing topological order in cold atoms - signatures of the fractional quantum Hall effect in small atomic droplets
- 11h50 - 12h20** **Mari Carmen Bañuls (Munich Center for Quantum Science and Technology)**
Tensor Networks at finite energy density: probing the eigenstate thermalization hypothesis
- 12h20 - 14h15** Lunch time
- 14h15 - 14h45** **Grégory Schehr (LPTHE, Sorbone-Université, Paris)**
Universal distribution of the number of minima for random walks and Lévy flights
- 14h45 - 15h15** Pause
- 15h15 - 17h05** **Série D** (Chair: Vivien Lecomte)

Série A – chair: Frédéric van Wijland

Thursday January 30, 9h00 - 10h30

- **ARNOULX DE PIREY, Thibaut**
CEA, Institut de Physique Théorique Gif-sur-Yvette, France
Anomalous Long-Ranged Influence of an Inclusion in Momentum-Conserving Active Fluids
- **MALEKAN, Azadeh**
Gulliver/ESPCI, Paris
Swarm robotics as learning active matter : a Langevin description.
- **GONZÁLEZ-ALBALADEJO, Rafael**
University Carlos III of Madrid, Madrid & LPTHE, Paris
Swarming Theory: Scale-Free Chaos and Extended Criticality
- **LAGOIN, Marc**
LOMA, Bordeaux, France
Investigating the coupling between advection and effective diffusion for micro-algi swimming in a micro-fluidic channel
- **CERDIN, Tristan**
PHENIX, Paris, France
Counting Active Particles in Boxes to Quantify their Dynamics
- **TOUZO, Léo**
LPENS, Paris, France
Fluctuations in active Riesz gases
- **MARTIN, David**
LPTMC, Paris, France
The transition to collective motion in nonreciprocal active matter
- **VAN WAES, Charlotte**
Matan Yah Ben Zion (Donders Institute), Nijmegen
A geometrical condition for self-limiting aggregation and cooperative transport in self-propelled particles
- **QI, Qingju**
Gulliver, Paris
Numerical study of the transition to collective actuation
- **BERNARD, Paul**
Laboratoire Gulliver, Paris, France
Mechanical Response of Active Solids

- **BUHL, Benjamin**
iLM | Gulliver Lab, Lyon, France | Paris, France
Fluctuations and elasticity in polar active solids
- **GONNELLA, Giuseppe**
Dipartimento di Fisica - Università degli Studi di Bari, Bari - Italy
Controlling flow patterns and topology in active emulsions
- **LUMAY, Geoffroy**
GRASP, Liege, Belgium
Triboelectric charging of grains flying in airflow
- **BLOT, Natalie**
Gulliver, ESPCI, Paris
Network topology shapes antigenic escape in viral-immune coevolution
- **RIVOIRE, Olivier**
Gulliver ESPCI, Paris, France
Evolutionary features in a minimal physical system: diversity, selection, growth, inheritance, and adaptation
- **KUDRYAVTSEV, Yaroslav**
Gulliver, ESPCI, Paris, France
On the statistics of polymer chains undergoing interchain exchange reactions

Série B – chair: Leonardo Mazza

Thursday January 30, 13h50 - 15h00

- **GIACHETTI, Guido**
LPENS, Paris
Semiclassical Quantum Trajectories in the Monitored Lipkin-Meshkov-Glick Model
- **FERRO, Florent**
LPTMS, Université Paris-Saclay, Orsay, France
Multipartite entanglement out of equilibrium
- **ZHANG, Zhao**
University of Oslo, Oslo, Norway
Entanglement phase transition with random surfaces

- **MORETTINI, Gianluca**
LPTMS, Orsay, Paris - France
Exceptional stationary state in a dephasing many-body open quantum system
- **PARIS, Nicolas**
Laboratoire de Physique Théorique de la Matière Condensée (LPTMC), Paris, France
Non-perturbative solution of the three-channel Kondo model
- **SIMON, Florian**
Laboratoire de Physique des Solides, Orsay, France
Quantum geometry of bands and superconductivity
- **TAILLAT, Pierre-Louis**
LPTMC, Paris, France
Viscosity of a Normal Fermi gas at low temperature
- **VAZ, Michael**
SPEC, Gif-sur-Yvette
Vacuum friction between two revolving atoms
- **MARCHÉ, Alice**
LPTMS, Orsay
 $SU(3)$ Fermi-Hubbard model with three-body losses
- **GRISON, Vincent**
LPTMC, Paris, France
Finite-temperature Bose-glass--normal-fluid transition in a 1D disordered Bose gas
- **BURKHARD, Mattheus**
MPQ - Université Paris Cité, Paris
Exploring driven dissipative phase transitions at fractal dimensions for polariton fluids
- **CASTIN, Yvan**
Laboratoire Kastler Brossel de l'ENS (LKB-ENS), Paris, France
Amortissement des phonons dans un superfluide : quand peut-on utiliser la règle d'or de Fermi ?

Série B – Continued

chair: Vivien Lecomte

Thursday January 30, 17h00 - 18h20

- **BIROLI, Marco**
LPTMS, Université Paris-Saclay, Orsay, France
Conditionally independent identically distributed random variables
- **BRÉMONT, Julien**
LPTMC / LJP, Paris, France
Persistence Exponents of Self-Interacting Random Walks
- **CHAIGNEAU, Adrien**
Physique de la Matière Condensée, Ecole polytechnique, Palaiseau, France
Diffusion-controlled reactions and the Steklov spectral problem
- **YE, Yilin**
Laboratoire de Physique de la Matière Condensée (UMR 7643), CNRS – Ecole Polytechnique, Palaiseau
First-passage times to a fractal boundary: Local persistence exponent and its log-periodic oscillations
- **SARFATI, Lila**
Matière et Systèmes Complexes, Paris, France
Relevance of fluctuations for interface equations
- **GUÉNEAU, Mathis**
LPTHE, Paris
Large Deviations in Switching Diffusion: from Free Cumulants to Dynamical Transitions
- **GRABSCH, Aurélien**
LPTMC, Paris, France
Semi-infinite simple exclusion process: from current fluctuations to target survival
- **CASINI, Francesco**
LPENS École normale supérieure, Paris, France
Duality for the multispecies stirring process with open boundaries
- **BIAGETTI, Leonardo**
CY Cergy Paris Université, Paris, France
Generalised BBGKY hierarchy for near-integrable dynamics

- **VENTURELLI, Davide**

LPTMC, Paris

Universal scale-free decay of spatial correlations: from soft to hard-core particle systems

- **HERMANN, Sophie**

PHENIX lab, Paris, France

Hyperforces in Statistical Mechanics

- **O'BYRNE, Jérémy**

Laboratoire Jean Perrin, Paris, France

A functional geometric framework for characterizing and classifying out-of-equilibrium field theories

- **ROGE, Antonin**

LPENSL, Lyon, France

Emergent symmetries and multicriticality in spin 1 systems

- **VIOT, Pascal**

LPTMC, Paris France

Random Sequential Covering: exact kinetics

- **GUILLET, Alexandre**

Max Planck Institute for the Physics of Complex Systems, Dresden, Germany

Elementary spectrum for the dissonance curve: from biophysics to number theory

- **LECOMTE, Vivien**

LIPhy / CNRS / Université Grenoble Alpes, France

Generalized Kirchoff's Current Law(s)

Série B – night session

chair: Cécile Cottin-Bizonne

Thursday January 30, 20h10 - 21h00

- **LEDOUX, Barnabe**
Gulliver, Paris
Inhibition of bacterial growth by antibiotics
- **DEFORET, Maxime**
Laboratoire Jean Perrin, Paris
Bacterial Glass Transition
- **DESPEIGNES, Nino**
Matière et Systèmes Complexes, Paris
Characterizing the dynamics of the Cellular Potts Model
- **TIXIDRE, Ferdinand**
LPTM, Pontoise, France
Is the cortical dynamics ergodic?
- **FRIES, Jacques**
Phenix, Paris, France
Macromolecular crowding controls the size and concentration of chemically active droplets
- **KALVODA, Lukas**
Laboratoire de Physique Théorique et Modèles Statistiques (LPTMS), Orsay, France
Anisotropic Particles Form Fibers to Avoid Geometrical Frustration
- **OUAZAN-REBOUL, Vincent**
LPTMS, Orsay, France
Network effects lead to self-organization in metabolic cycles of self-repelling catalysts
- **CARACCILO DI TORELLA, Pietro**
LPTMS, Orsay
Frustrated-self assembly with multiple particle types
- **MONCEAU, Pascal**
Laboratoire Matière et systèmes complexes UMR CNRS 7057, PARIS
Calcium driven synchronisation in neuronal cultures

Série C – chair: Leticia Cugliandolo

Friday January 31, 9h00 - 10h50

- **SEKIMOTO, Ken**
Gulliver-ESPCI / MSC-UPC, Paris, France
Martingale drift of Langevin dynamics and classical canonical spin statistics - II
- **BARROS, Nicolas**
Laboratoire de Physique de l'ENS de Lyon, Lyon, FRANCE
Probabilistic Work Extraction on a Classical Oscillator Beyond the Second Law
- **MANACORDA, Alessandro**
CNR-ISC, Rome, Italie
Optimal Control of an Electromechanical Energy Harvester
- **AKSIL, Mathéo**
Laboratoire Jean Perrin, Sorbonne Université/CNRS, Paris, France
Statistical field theory approach to fluctuations in a micro-RNA molecular circuit
- **ROY, Dipankar**
Laboratoire Jean Alexandre Dieudonné, Université Côte d'Azur, Nice, France
Universality in coupled stochastic Burgers systems where flux Jacobian is degenerate
- **ZAHRA, Ali**
LPCT, Université de Lorraine, Pontoise
Asymmetric exclusion process with next nearest neighbor interaction
- **ILLIEN, Pierre**
PHENIX, Sorbonne Université, Paris
Non-Gaussian density fluctuations in the Dean-Kawasaki equation
- **BURENEV, Ivan**
LPTMS, Paris, France
Importance Sampling for counting statistics in one-dimensional systems
- **CARILLO, Louis**
Cermics, Champs-sur-marne, France
Narrow escape problem and Quasi-stationary distribution
- **COFRE, Rodrigo**
NeuroPsi, Saclay
Entropy production of multivariate Ornstein-Uhlenbeck processes correlates with consciousness levels in the human brain

- **GALLIANO, Leonardo**
Gulliver, Paris
Two-Dimensional Crystals far from Equilibrium
- **LE LAY, Grégoire**
Matière et Systèmes Complexes, Paris, France
How do 2D-dice fall ?
- **MAIRE, Raphaël**
Laboratoire de Physique des Solides, Orsay, France
Reduced interface fluctuation in hyperuniform systems
- **PLATI, Andrea**
Laboratoire de physique des solides, Orsay, France
Absorbing Phase Transitions in Vibrated Granular Matter: Experimental Insights
- **SUANNO, Rocco**
institut Lumière Matière (iLM) , Lyon
Oscillatory driving of spinodal decomposition
- **RYKNER, Armand**
CEA/SPEC, Gif-sur-Yvette
Response of a out-of-equilibrium liquid to a temperature step
- **HAYAKAWA, Hisao**
Yukawa Institute for Theoretical Physics, Kyoto University, Kyoto, Japan
Thermomajorization Mpemba effect
- **KÜHN, Tobias**
Institut de la Vision, Sorbonne Université, Paris
Free energies and entropies as diagrammatic expansions around non-Gaussian theories
- **BERLIOZ, Théotim**
LPTMC, Paris
Tracer and current fluctuations in driven diffusive systems
- **FRANCAZI, Emanuele**
Laboratoire de physique, Paris, France
Impact of noise choice in Generative Diffusion Models
- **URFIN, Raphaël**
LPENS, ENS-PSL, Paris
The Memorization/Generalization Transition in Diffusion Models

Série D – chair: Vivien Lecomte

Friday January 31, 15h15 - 17h05

- **VAN MASTRIGT, Ryan**
Gulliver, France
Guiding Colloidal Re-Folding using Machine Learning
- **ALTIERI, Ada**
MSC, Université Paris Cité, Paris, France
Decoding gut microbiome complexity through the lens of disordered systems
- **ZAKINE, Ruben**
Laboratoire d'Hydrodynamique, Ecole polytechnique, Palaiseau
Patterns robust to disorder in spatially-extended generalized Lotka-Volterra ecosystems
- **BILAI BILOA, Kevin**
Institut Lumière Matière, Lyon
Optimal navigation of Brownian particles in disordered environments
- **AMATO, Lorenzo**
Paul Scherrer Institute, Villigen, Switzerland
Dipolar Quantum Spin Glasses in non-Kramers doped insulators
- **BERNARD, Maximilien**
LPENS/LPTMS, Paris
Stochastic Porous Medium Equation and anomalous scalings
- **GERBINO, Federico**
LPTMS, Orsay
Measurement-Induced Phase Transition in State Estimation of Chaotic Systems and the Directed Polymer
- **DAERR, Adrian**
Matière et Systèmes Complexes, Paris, France
Parametric instability coupling longitudinal and transverse waves on rivulets in a Hele-Shaw cell
- **HARTMANN, Alexander K.**
Institute of Physics, University of Oldenburg, Oldenburg, Germany
Non-universality for crossword-puzzle percolation
- **LAUDICINA, Corentin**
Non-Equilibrium Soft Matter @ Eindhoven University of Technology, The Netherlands, Eindhoven
Simple Fluctuations in Simple Glass Formers

- **DAVIER, Naïmo**
LOMA, Bordeaux
Emerging electromagnetisms in frustrated spin systems
- **SANTANA, Roberto**
Intelligent Systems Group, San Sebastian, Spain
Neuron coverage distributions in phase transitions of the Ising model
- **PONCET, Alexis**
Laboratoire de physique à l'ENS de Lyon, Lyon
Interpreting Neural Operators: How Nonlinear Waves Propagate in Nonreciprocal Solids
- **MABILLARD, Joël**
Matière et Systèmes Complexes, Paris
Hydrodynamics of crystals
- **BARBIER, Léo-Paul**
Gulliver, Paris 05, France
Swimming droplets: Probing the effect of counterflow and gravity
- **ZANCHI, Dražen**
MSC, Paris
Perversion-antiperversion pairing in chiral filaments
- **BOULOGNE, François**
Laboratoire de Physique des Solides, Orsay
Straight to zigzag transition of foam pseudo Plateau borders on textured surfaces
- **CHAMPAGNAC, Pierre**
Gulliver, ESPCI, Paris, France
Dynamics of a colloidal probe in a micellar solution
- **LENZ, Martin**
LPTMS & PMMH, Orsay & Paris
Topological defect engineering enables size and shape control in self-assembly
- **AKARAPIATTANA, Pawat**
LPTMS, Orsay, France
1-d self-assembly of complex elastic molecules
- **ZELENSKIY, Andrey**
LPTMS, Orsay, France
Mean-field description of frustrated self-assembly