

# EDPIF PHD SCIENTIFIC DAY

Monday, 27th of June 2022

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## 2022 EDPIF PhD Scientific Day

The *École Doctorale Physique Île-de-France* organises a meeting for all second year PhD students. Selected volunteer PhD students and researchers will give talks on a wide range of topics, from fundamental interactions and quantum fluids, to condensed matter and biological systems. The day will be filled with scientific discussions, poster sessions, coffee breaks and a tasty buffet for lunch.

For more information visit <https://www.edpif.org/journee/2022/>

## Organizing committee

Dipranjan CHATTERJEE, *Laboratoire de Physique des Solides*

Maximilian DICHTL, *Laboratoire de Physique Théorique et Hautes Energies*

Mateo ULDEMOLINS, *Laboratoire de Physique des Solides*

# Timetable

Monday, 27 of June

<b>8:30–8:50</b>	<b>Registration</b>
<b>9:00–9:10</b>	<b>Welcome remarks</b>
<b>9:10–9:55</b>	<b>Jean Dalibard</b> Invited talk: <i>Scale and conformal invariance for cold atomic gases</i>
9:55–10:10	Constant Bourdeloux
10:10–10:25	Joaquín Bermejo
10:25–10:40	Xavier Ballu
10:40–10:55	Renaud Baillou
<b>10:55–11:30</b>	<b>Coffee break &amp; poster session</b>
11:30–11:45	Suzanne Lafon
11:45–12:00	Simon Metayer
12:00–12:15	Zakarya Ouzit
12:15–12:30	Guillaume Bouillard
12:30–12:45	Perla Dergham
12:45–13:00	Magid Badaoui
<b>13:00–14:00</b>	<b>Lunch &amp; poster session</b>
<b>14:00–14:45</b>	<b>François Graner</b> Invited talk: <i>From cells to tissues</i>
14:45–15:00	María Benito
15:00–15:15	Gianmarco Spera
15:15–15:30	Sirine Amiri
15:30–15:45	Raquel Galazo
<b>15:45–16:15</b>	<b>Coffee break &amp; poster session</b>
16:15–16:30	Louis Waquier
16:30–16:45	David Fainsin
16:45–17:00	Manuel Gundin
17:00–17:15	Sujit Panigrahy
17:15–17:30	Pierre Tapie
17:30–17:45	Enrico Ventura
<b>17:45–18:00</b>	<b>Closing remarks</b>
<b>18:00–18:30</b>	<b>Farewell cocktail</b>

## Scale and conformal invariance for cold atomic gases

*Jean DALIBARD*

Collège de France and Laboratoire Kastler Brossel

Scale invariance, a concept first introduced in high energy physics, has found many applications in the physics of quantum gases and fluids. It applies to Fermi gases in the unitary regime, to two-dimensional Bose gases, and – in a discrete version – to the few-body problem. In this presentation, I will describe some practical illustrations of this scale invariance, both for stationary situations and for time-dependent problems, in which case scale invariance can be incorporated in a more general symmetry, the so-called conformal invariance.

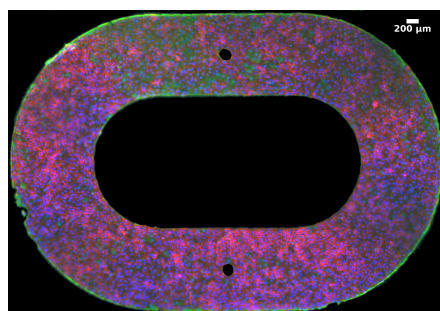
## From cells to tissues

*François GRANER*

Complex Systems and Matter, CNRS and Université de Paris-Cité

The fruit fly larva is a maggot which looks like a dull white cylinder. Within a few days, and without any changes in its genome sequence, it metamorphoses. It gets its sophisticated adult fly shape with wings, legs, antennas, and compound eyes. How do cells self-assemble, migrate, deform, and rearrange to form a tissue ?

To approach this question step by step, we will journey from genetics to mechanics, from developmental biology to soft matter physics, and from experiments to theory. We will investigate flows within geometries specifically designed to discriminate between models. We will witness the notion of "emergence", i.e. appearance at tissue scale of mechanical properties or collective movements which do not seem to exist at cell scale.



# List of Contributed Talks

## **How cytoskeletal forces alter nuclear protein and chromatin distributions during confined cell migration**

Sirine AMIRI, *Laboratoire de Physique de l'École Normale Supérieure*

## **Application of parameter space compression to an actin system**

Magid BADAoui, *Institut Jacques Monod, Université Paris Cité*

## **Supercurrent noise in a phase-biased superconductor-normal ring in thermal equilibrium**

Xavier BALLU, *Laboratoire de Physique des Solides*

## **Probing Josephson weak links near pinch-off using microwave spectroscopy**

María BENITO, *Institut Rayonnement-Matière de Saclay, CEA-Saclay*

## **Direct observation of Volkov-Pankratov relativistic spectrum in a topological heterojunction**

Joaquín BERMEJO, *Laboratoire de Physique de l'École Normale Supérieure*

## **A time reversal metasurface for mimicking the cocktail party effect**

Constant BOURDELOUX, *Institut Langevin, ESPCI Paris*

## **Probing the emission of Bragg plasmonic cavities**

Guillaume BOULLIARD, *Laboratoire Matériaux et Phénomènes Quantiques*

## **Probing surface magnetism with highly charged ions by X-ray spectroscopy**

Perla DERGHAM, *Institut des NanoSciences de Paris*

## **Highly reconfigurable quantum source for quantum telecommunication**

David FAINSIN, *Laboratoire Kastler Brossel*

## **Self-similar solutions for fuzzy dark matter**

Raquel GALAZO, *Institut de Physique Théorique, CEA*

## **A spin photon interface for quantum information applications**

Manuel GUNDÍN, *Centre de Nanosciences et de Nanotechnologies*

## **Effect of temperature on friction at the liquid/solid interface**

Suzanne LAFON, *Laboratoire de Physique de Solides*

## **Quantum field theory techniques applied to fluctuating elastic membranes**

Simon METAYER, *Laboratoire de Physique Théorique et Hautes Energies*

**FRET-mediated collective blinking of self-assembled stacks of semiconducting nanoplatelets**

Zakarya OUZIT, *Institut des NanoSciences de Paris*

**Skyrmions in Co based synthetic antiferromagnet**

Sujit PANIGRAHY, *Laboratoire de Physique des Solides*

**Bacterial exploration in confined environment**

Renaud BAILLOU, *ESPCI, Paris*

**MIPS beyond simple repulsive interactions**

Gianmarco SPERA, *Complex Systems and Matter, Université Paris-Cité*

**Towards a biomimetic mechanoreceptor model**

Pierre TAPIE, *Laboratoire Jean Perrin*

**Why statistical mechanics should convince you that sleeping is good**

Enrico VENTURA, *Laboratoire de Physique de l'Ecole Normale Supérieure*

**Optomechanical measurement of individual nanoparticles: towards the analysis of a single virus**

Louis WAQUIER, *Laboratoire Matériaux et Phénomènes Quantiques*

# List of Posters

## **Squeezing of nonlinear spin observables by one axis twisting in the presence of decoherence: an analytical study**

Youcef BAAMARA, *Laboratoire Kastler Brossel*

## **Probing atom-surface interactions with an atomic quantum sensor**

Yann BALLAND,

## **Complete design of an experimental platform for trapping cold atoms interfaced with slow guided light**

Adrien BOUSCAL, *Laboratoire Kastler Brossel*

## **In vivo high-throughput probing of synaptic connectivity using two-photon holographic optogenetic stimulation**

Chung Yuen CHANG, *Institut de la Vision*

## **Classification of brain states and behavioural motor response strategy to vestibular stimulation**

Sharbatanu CHATTERJEE, *Institut Jean Perrin*

## **Contrast agent based on nano-assemblies of fluoride based nanocrystals and aryl dizonium salts for Raman bioimaging**

Huan CHEN, *Laboratoire Matière et Systèmes Complexes*

## **Room temperature highly photostable perovskite nanocrystals coupled to an optical tapered nanofiber**

Marianna D'AMATO, *Laboratoire Kastler Brossel*

## **Computational microscopy in complex media**

Alexandra D'ARCO, *Laboratoire Kastler Brossel*

## **Guided elastic waves in a stretched visco-hyperelastic plate**

Alexandre DELORY, *Institut Langevin, ESPCI*

## **Effective cavity rate equation model for III-V-ON-Si nanobeam lasers**

Andrea DEMARCHI, *Centre de Nanosciences et de Nanotechnologies*

## **Light-induced phase separation and pattern formation by swimming micro-algae**

Isabelle EISENMANN, *Laboratoire de Physique de l'Ecole Normale Supérieure*

## **Iron's microstructure under extreme conditions**

Robin FREVILLE, *Laboratoire Matière en Conditions Extrêmes, CEA*



## **Circulating tumor cells deformation and recovery in a microvasculature microfluidic in vitro model**

Emile GASSER, *Institut Curie*

## **Carbon footprint of a research lab: why, how... and what's next?**

Caroline GIUGLARI, *Institut Curie*

## **Quasiparticle Andreev scattering in the $\nu = 1/3$ fractional quantum Hall regime**

Pierre GLIDIC, *Centre de Nanosciences et de Nanotechnologies*

## **Experimental quasi-1D wave turbulence and transition to a shock wave regime**

Ricard GUILLAUME, *Matière et Systèmes Complexes*

## **TBA**

Ludwig HRUZA, *Laboratoire de Physique de l'Ecole Normale Supérieure*

## **Systematic calculation of total atomic energies of ground state configurations**

Jinxia HU, *Laboratoire Kastler Brossel*

## **String Theory and compactifications**

David JARAMILLO-DUQUE, *Laboratoire de Physique de l'Ecole Normale Supérieure*

## **Phonon drag thermal Hall effect in metallic strontium titanate**

Shang JIANG, *Laboratoire de Physique et d'Étude des Matériaux, ESPCI*

## **Splitting probabilities of jump processes**

Jeremie KLINGER, *Laboratoire de Physique Théorique de la Matière Condensée*

## **Efficient, compact and reliable fibred single-photon source**

Nico MARGARIA, *Quandela*

## **Scanning near-field optomechanical crystal**

Théo MARTEL, *Centre de Nanosciences et de Nanotechnologies*

## **$H_2^+$ spectroscopy for standard model test and fundamental constant determination**

Abdessamad MBARDI, *Laboratoire Kastler Brossel*

## **Probing dissipation length-scale in spreading drops using granular suspensions**

Alice PELOSSE, *Matière et Systèmes Complexes*

## **Toward the nano-g with a cold atoms absolute gravimeter**

Maxime PESCHE, *LNE-SYRTE, Observatoire de Paris*

## **A cascade of droplets in cloud**

Florian POYDENOT, *Laboratoire de Physique de l'Ecole Normale Supérieure*

**Non-Hermitian spin dynamics and universal quantum-Zeno physics in one-dimensional fermions with two-body losses**

Lorenzo ROSSO, *Laboratoire de Physique Théorique et Modèles Statistiques*

**CVD-graphene based transistor arrays for biodetection of nucleic acid sequences**

Christian SCHRAEDER, *Institut Cochin*

**Inducing d-wave high-T<sub>c</sub> superconductivity in graphene and beyond**

Kevin SEURRE, *CNRS-Thales*

**Near ambient pressure catalytic properties at the nanoscale probed by surface sensitive techniques**

David SIMONNE, *Synchrotron SOLEIL, Univ. Grenoble Alpes, CEA Grenoble*

**Détermination de l'alignement de bande entre le CdSe et CdS à partir du spectre d'absorption collectif de nanocristaux coeur/coquille CdSe/CdS**

Damien SIMONOT, *Institut des Nanosciences de Paris*

**X-ray excited optical luminescence of boron nitride materials**

Laura SUSANA, *Laboratoire de Physique des Solides*

**Stabilizing a four-legged cat state by four-photon dissipation**

Aron VANSELOW, *Laboratoire de Physique de l'Ecole Normale Supérieure*

**Actin cortex mechanics probed in live cells**

Joseph VERMEIL, *ESPCI*

# Useful Information

Talks will be held at the **Amphi Farabeuf, Campus des Cordeliers**, 15 Rue de l'École de Médecine, 75006 Paris. It is situated on the ground floor.

The **poster session** will be held at the cloisters outside the conference hall.

## How to get to the venue?

Closest metro, Odeon (Metro line 4 and 10), Cluny La Sorbonne (Metro line 10)

