

Simon Gravelle

Physicist in soft matter
and fluids at interfaces

LIPhy

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<https://simongravelle.github.io>

Research experience

- 2023-today Postdoctoral Researcher (MSCA)
Laboratoire Interdisciplinaire de Physique, Université Grenoble Alpes, **Grenoble, France**
Hybrid nanoporous materials for fluid mixture separation
Group leader : CNRS DR Benoit Coasne
- 2021-2023 Postdoctoral Researcher
Institute for Computational Physics, Universität Stuttgart, **Stuttgart, Allemagne**
NMR properties of water at the interfaces of porous salt crusts
NMR dynamics of hydrophilic gels and polymers
Group leaders : Pr. Christian Holm and Assistant Pr. Alexander Schlaich
- 2019-2021 Postdoctoral Researcher
Queen Mary University of London, **Londres, Royaume-Uni**
Adsorption of two-dimensional nanoparticles at fluid interfaces
Viscosity of graphene nanoparticle suspensions under shear
Group leader : Pr. Lorenzo Botto
- 2016-2019 Postdoctoral Researcher (FONDECYT)
Universidad Adolfo Ibáñez, **Viña del Mar, Chili**
Bio-inspired water capture systems by desert plants
Modeling microtubule dynamics in plant cells
Group leaders : Pr. Jacques Dumais
- 2012-2015 Doctorant
Institut Lumière Matière, Université Claude Bernard Lyon 1, **Lyon, France**
Fluidic transport in bio-inspired nano-channels
Charge fluctuations and reversible ion adsorption in synthetic nanopores
Supervisors : Pr. Lydéric Bocquet, CNRS DR Christophe Ybert and Pr. Laurent Joly

Grants

- 2023 **Marie Skłodowska-Curie Actions fellowship (MSCA)**
Laboratoire Interdisciplinaire de Physique, Université Grenoble Alpes, Grenoble, France
Hybrid nanoporous materials for the separation of fluid mixtures
Total duration of 2 years + approximately 20000 euros research budget
- 2017 Bourse postdoctorale **FONDECYT-CONICYT**
Universidad Adolfo Ibáñez, Viña del Mar, Chili
A biomimetic membrane with highly asymmetric water transport properties
Duration of 3 years + approximately 15000 euros research budget

Open science projects

- [1] **MAICoS** Co-developer of a software allowing the analysis of the structure of confined and interfacial fluid systems from molecular simulations
<https://maicos-analysis.org>
- [2] **NMRforMD** Developer of a code allowing the analysis of relaxation T_1 and T_2 from molecular simulations
<https://nmrformd.readthedocs.io>
- [3] **Compte Github** FAIR¹ sharing of scripts and simulation data
Systematic sharing of research data maximizes the visibility of my work and ensures the re-productivity of results
<https://github.com/simongravelle>
- [4] **LAMMPS tutorials** Molecular simulation tutorials
The development of this site, which gathers about 2000 visitors per month, has increased my visibility and has even led to the launch of several collaborations
<https://lammptutorials.github.io>

Expertise

Simulation moléculaire	Molecular dynamics Monte Carlo approach Free energy method (<i>Umbrella sampling</i>)
Other	Finite element metho NMR relaxation time measurements
Experimental	Fluorescence correlation spectroscopy (FCS) Membrane characterization
Code	Python, Octave - data analysis and software development html/css/rST - online content sharing Git - collaborative work

Interests

Fields	Nanofluidics, Soft matter, Fluid at interfaces, Biomimetics, Statistical physics
Phénomènes	Fluid transport, Adsorption, Collective effects, Input effects, Nuclear magnetic relaxation
Other	Outreach, Open science, Tutoring, Video production

1. FAIR : *Findability, Accessibility, Interoperability, Reusability*

Presentations

- 06/2022 **International Society for Porous Media (InterPore)**, online
Water confined in salt crusts : insights from molecular simulations
- 10/2021 **Invited seminar**, LOMA, Bordeaux, France
Unidirectional water valve in Tillandsia plant
- 03/2021 **March meeting of the American Physical Society**, online
Adsorption of graphene-oxide nanoparticles at a water-vapour Interface : a molecular dynamics investigation
- 01/2021 **Physics at Veldhoven**, online
Fluid dynamics of a nanographene
- 11/2020 **Division of Fluid Dynamics of the American Physical Society**, online
Deviations from Jeffery's theory in the dynamics of atomically-thin sheet-like molecules in shear flow
- 01/2020 **Physics at Veldhoven**, Physics at Veldhoven, Eindhoven, Pays-Bas
Hydrodynamics of graphene suspensions : liquid exfoliation of multilayer graphene (poster)
- 11/2019 **Division of Fluid Dynamics of the American Physical Society**, Seattle, Washington, États-Unis
Liquid phase exfoliation of graphene : a molecular dynamics investigation
- 10/2018 **GdR Liquides aux interfaces**, Bordeaux, France
Design of a unidirectional water valve in Tillandsia
- 05/2018 **Séminaire invité**, LIPhy, Grenoble, France
Nanofluidics : a theoretical and numerical investigation of fluid transport in nanochannels
- 04/2016 **Séminaire invité**, Universidad Adolfo Ibáñez, Viña del Mar, Chili
Optimizing water permeability through the hourglass shape of aquaporins : From hydrodynamics to single-file transport
- 11/2015 **Soutenance de thèse**, Lyon, France
Nanofluidics : a theoretical and numerical investigation of fluid transport in nanochannels
- 12/2014 **Computer Simulation of Combined Fluids**, Londres, Royaume-Uni
Optimizing water permeability through the hourglass shape of aquaporins : From hydrodynamics to single-file transport
- 10/2014 **GdR Liquides aux interfaces**, Bordeaux, France
Pink noise of ionic current, theory and modelisation
- 07/2014 **Séminaire invité**, ICE group, Londres, Royaume-Uni
Optimizing water permeability through the hourglass shape of aquaporins
- 11/2013 **Division of Fluid Dynamics of the American Physical Society**, Pittsburgh, Pennsylvanie, États-Unis
Does the hourglass shape of aquaporins optimize water permeability ?
- 10/2013 **GdR Liquides aux interfaces**, Lyon, France
Optimizing water permeability through the hourglass shape of aquaporins

Education

- 2012-15 **PhD in Physics**
Université Claude Bernard Lyon 1, Lyon, France
- 2010-12 **Master of Science in Fundamental Physics**
École Normale Supérieure (ENS) de Lyon, Lyon, France
- 2007-10 **Bachelor of Physics**
Université de Franche Comté, Besançon, France
- 2007 **Scientific Baccalaureate**
Lycée Édouard Belin, Vesoul, France

Teaching

- 2021-23 University of Stuttgart, Stuttgart, Allemagne
Design and supervision of practical assignments for Master's students
128 h in total, 2 students per group
- 2013-15 Institut universitaire de technologie (IUT) de Lyon, Lyon, France
Materials science course for 1st year students
19 h in total, approximately 30 students per class
- 2012-15 Institut universitaire de technologie (IUT) de Lyon, Lyon , France
Practical work in materials science for 1st year students
185 h in total, approximately 20 students per class
- 2011-13 Lycée La Martinière Monplaisir, Lyon, France
Preparation and supervision of exams for first year students in "classes préparatoires aux grandes écoles"
2 hours per week, 3 students per session