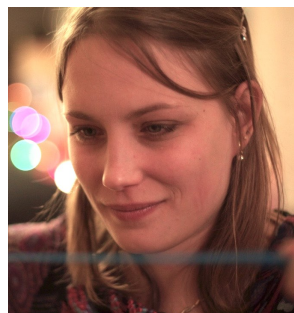


Anaïs GAUTHIER

CNRS researcher

Physics of liquids and interfaces



Research interests

Fluid dynamics: rheology, drop impact and bouncing, boundary layers, levitation

Interfacial phenomena: soap films, capillarity, active particles, Marangoni flows

Wetting phenomena: surface texturation, contact line dynamics, condensation

Education

2015

PhD - École Polytechnique

Paris, France

Physics of liquids and interfaces. Highest honors.

2012

Graduation from École Polytechnique

Paris, France

Major: Fluid mechanics, soft matter

2012

Graduation from École des Mines de Paris

Paris, France

Major: Material science and engineering

Employment

2022 - Today

CNRS Researcher (section 5) - Institut de Physique de Rennes

Rennes, France

- Capillary phenomena in thin films, surface rheology, armoured soap films
- Marangoni flows and instabilities

2019 - 2021

Post-doctoral researcher & ATER - ESPCI

Paris, France

Advisor : **Annie Colin** - MIE

- Characterization of the instabilities that appear during the shear-thickening of complex fluids, using a home-made sensors that give a cartography of the normal stresses.
- Spreading of newtonian and complex fluids

2017 - 2018

Post-doctoral researcher - University of Twente

Enschede, The Netherlands

Advisors : **Detlef Lohse** and **Devaraj van der Meer** - Physics of Fluids Laboratory

- Dynamics of drops and solid particles on a volatile interface (liquid nitrogen): auto-propulsion mechanism and collective motion: «capillary orbits ».
- Experimental measurement of the liquid surface deformation before a disk impact.

2016

Researcher, applied research - L'Oréal

Chevilly-Larue, France

- Wetting of a mattress of aerogel particles.
 - Formulation and rheology of polymer gels compatible with highly charged ions.
- Direct supervision of 2 research assistants

2012 - 2015

PhD in LadHyX - École Polytechnique and PMMH - ESPCI

Paris, France

PhD advisors: **Christophe Clanet** and **David Quéré**

Dynamic hydrophobicity and Hydrophobic dynamics

- Experimental study and modeling of « dynamical levitation » process, where incoming objects are repelled when approaching the boundary layer of a moving surface.
- Impact dynamics of drops on superhydrophobic surfaces decorated with macrottextures, and resulting reduction of the contact time.

April - October 2012

Research intern - SVI lab - Saint-Gobain Research

Aubervilliers, France

Advisors: **Etienne Barthel** and **Jérémie Teisseire**

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Born January 4th, 1988

French Native language

English Fluent

Italian Fluent

Contact angle hysteresis on anisotropic textured surfaces

- Micro-fabrication and replication of sol-gel silica surfaces.
- Experimental study of the depinning of the contact line on anisotropic textured surfaces. Analogy with the movement of dislocations inside a crystal structure.

April - August 2011

Research intern - Aizenberg Lab - Harvard University

Cambridge, United States

Advisors: **Benjamin Hatton** and **Joanna Aizenberg**

A study of the bouncing of water droplets in high humidity conditions

- Experimental study of energy loss and drop spreading during impacts on superhydrophobic surfaces covered with condensation.

Supervision, teaching and scientific mediation

Direct supervision of PhD Students

2023 - 2026 - Youna Louyer (50% with Isabelle Cantat)

2025 - 2028 - Marie Pateau (50% with Isabelle Cantat)

Participation to the supervision of PhD students as a post-doc

2017 - Utkarsh Jain (PhD defense in 2020)

2019 - Marion Krapez (PhD defense in 2022)

Supervision of MSc. Students

2022 - Milène Aubry (5 months)

2019 - Olivier Gamache (3 months)

2018 - Marwane Taoufiki (4 months)

2016 - Ambre Bouillant (4 months)

2015 - Pierre Chantelot (6 months)

2014 - Sean Symon (6 months)

2014 - Mayuko Murano (2 months)

Supervision of Bachelor Students

2025 - Léa Guyart (2 months)

2025 - Clémence Briend (2 months)

2022 - Hugo Delrieu (3 months)

2017 - Sander Markus (3 months)

2013 - Olivier Howaizi (4 months)

Teaching

2020, 2022, 2024 Teaching assistant in condensed matter physics *École Polytechnique, Paris*

Supervision of research projects on soft matter and liquid physics (2-3 groups of 2 students, 60h/year).

2019 - 2021 - Teaching assistant in statistical physics *ESPCI, Paris*

Practical lessons and assisted classwork on applied statistical physics (135h)

2017 - 2018 - Teaching assistant in fluid mechanics *University of Twente, Netherlands*

Practical lessons in fluid mechanics (surface tension measurements, rheology, surface shape of a rotating liquid) (2nd year bachelor students, 8 groups of 2, 15h/year)

Support (experimental and theoretical) for small projects done in the lab: drop impacts on a bath, splashing, self-propulsion, etc (5 groups of 4 2nd year bachelor students, 32h/year)

2013 - 2015 Teaching assistant *Paris Descartes University*

Physics class for undergraduate students in medical school (2 classes of 40 students, 64h/year). Fluid mechanics, particle diffusion, electrostatics.

2012 - 2013 - Teaching assistant in fluid mechanics

ESPCI, Paris

Experimental and modeling support on « hands-on » projects: paper plane levitation, teapot effect, liquid dampers (4 groups of 2-3 undergraduate students, 14h).

2012 - 2015 Tutor

Paris

Private lessons in advanced maths, physics and chemistry to prepare undergraduate students to high competitive exams for top French Engineering schools and medical school (3 students, 30h/year).

Responsibilities & Awards

2019 APS/DFD Gallery of Fluid Motion Award

Droplets impaling on a cone. Guillaume Durey, Quentin Magdelaine, Mathias Casiulis, Hoon Kwon, Julien Mazet, Pierre Chantelot, Anaïs Gauthier, Christophe Clanet, and David Quéré.

2025 EDFC2 « Visions of Fluid Dynamics » Video Competition

Marbles in a soap film. Youna Louyer, Isabelle Cantat, Anaïs Gauthier

Responsibilities

- Scientific Committee of the 56th French Rheology Group (2022)
- Elected member of the Laboratory Council of the Institut de Physique de Rennes (2022-2026)
- Responsible for seminars of the Soft Matter Department of the IPR (2022-2023)
- Seminar leader for the Physics of Fluids Laboratory (2018)

Referee for the following journals:

Physical Review Letters, Physical Review Fluids, Journal of Fluid Mechanics, International Journal of Multiphase Flow, Nature Communications, Soft Matter, Scientific Reports, Physical Review E

Typically 5-10 reviews/year

Scientific mediation

2019 Veritasium

Participation in the movie of the Youtuber Derek Muller (Veritasium) on the inverted Leidenfrost Effect ($\approx 1\,500\,000$ vues).

2018 La recherche à l'école

Lycée Parc de Vilgénis, Massy

Surface tension, superhydrophobicity and Marangoni flows: how insects live on water

2012-2016 & 2022, 2024 Fête de la science

ESPCI, Paris

Construction of experiments and présentations on wetting and Leidenfrost effect (for classes from primary and middle school, 3 full days/year)

Oct. 2008 - Apr. 2009 Scientific mediator

Troyes

Initiation of primary and elementary school pupils to scientific experiments and reasoning (6 months full time, in collaboration with the teachers)

Responsibilities & Awards

2025 ANR JC-JC (Principal Investigator). Project “*MicroRheoFilm*”. Four-year funding for the development of an interfacial microrheometer capable of measuring surface viscosities as low as 0.1 nPa s m .

2025 CNRS “Emergence” Call – One-year PhD funding on the project “Measuring the Infinitesimal: A New Tool to Measure Surface Viscosity in Soap Films”.

2023 Doctoral Fellowship (Contrat Doctoral Ordinaire). PhD funding on the project “Physics of Grain-Loaded Films: From Particle Attraction to Surface Rheology”.

2022 Scientific Start-up Grant (AIS), Rennes Métropole – €40,000 funding.

Publications & Communications

19 publications, 1 patent, 10 invited seminars, 20+ international conferences.

Peer-reviewed journal publications

1. **Sliding dynamics of a particle in a soap film.** Youna Louyer, Benjamin Dollet, Isabelle Cantat & Anaïs Gauthier. *JFM Rapids*, **1007**, R8 (2025) - disponible sur Arxiv: <https://arxiv.org/abs/2502.09179>
2. **Line tension in a thick soap film.** Théo Lenavetier, Gaële Audéoud, Marion Berry, Anaïs Gauthier, Raphaël Poryles, Corentin Trégouët and Isabelle Cantat. *Physical Review Letters*, **132** 054001 (2024).
3. **Shear thickening in presence of adhesive contact forces: the singularity of cornstarch.** Anaïs Gauthier, Guillaume Ovarlez & Annie Colin. *JCIS* **650** 1105-1112 (2023)
4. **Spreading of complex fluids with a soft blade.** Marion Krapez, Anaïs Gauthier, Jean-Baptiste Boitte, Odile Aubrun, Jean-François Joanny & Annie Colin. *Physical Review Fluids* **7**, 084002 (2022).
5. **New pressure sensor array for local normal stress measurement in complex fluids.** Anaïs Gauthier, Mickaël Pruvost, Olivier Gamache & Annie Colin. *Journal of Rheology*, **65**, 583 (2021) - disponible sur Arxiv: <https://arxiv.org/abs/2010.04474>
6. **Air-cushioning effect and Kelvin-Helmholtz instability before the slamming of a disc on water.** Utkarsh Jain, Anaïs Gauthier, Detlef Lohse & Devaraj van der Meer. *Physical Review Fluids* **6**, L042001 (2021)
7. **Total-internal-reflection reflectometry for measuring small deflections of a fluid surface.** Utkarsh Jain, Anaïs Gauthier & Devaraj van der Meer. *Experiments in Fluids* **62**, 235 (2021) - disponible sur Arxiv: <https://arxiv.org/pdf/2009.00531>.
8. **Impact of the wetting length on flexible blade spreading.** Marion Krapez, Anaïs Gauthier, Hamid Kellay, Jean-Baptiste Boitte, Odile Aubrun, Jean-François Joanny & Annie Colin. *Physical Review Letters* **125**, 254506 (2020)
9. **Slippery Bounces.** Anaïs Gauthier. *Journal of Fluid Mechanics* **896 F1** (2020) — Article « Focus on Fluids »
10. **Inverse Leidenfrost drop manipulation using menisci.** Anaïs Gauthier, Guillaume Lajoinie, Jacco Snoeijer and Devaraj van der Meer. *Soft matter*, **16**, 4043-4048 (2020)
11. **Capillary orbits.** Anaïs Gauthier, Devaraj van der Meer, Jacco H. Snoeijer & Guillaume Lajoinie. *Nature Communications* **10**, 3947 (2019)
12. **Self-propulsion of inverse Leidenfrost drops on a cryogenic bath.** Anaïs Gauthier, Christian Diddens, Rémi Proville, Detlef Lohse & Devaraj van der Meer. *PNAS*, **116** 1174-1179 (2019)
13. **Droplets impaling on a cone.** Guillaume Durey, Quentin Magdelaine, Mathias Casiulis, Hoon Kwon, Julien Mazet, Pierre Chantelot, Anaïs Gauthier, Christophe Clanet, and David Quéré *Physical Review Fluids*, **5**, 110507 (2020) Article associé à une video gagnante de l'APS-DFD
14. **Aerodynamic repellency of impacting liquids.** Anaïs Gauthier, Ambre Bouillant, Christophe Clanet & David Quéré. *Physical Review Fluids*, **3**, 054002 (2018)
15. **Water ring-bouncing on repellent singularities.** Pierre Chantelot, Ali Mazloomi Moqaddam, Anaïs Gauthier, Shyam Shikatamarla, Christophe Clanet, Ilya Karlin & David Quéré. *Soft Matter*, **14**, 2227-2233 (2018)
16. **Aerodynamic Leidenfrost effect.** Anaïs Gauthier, James C. Bird, Christophe Clanet & David Quéré. *Physical Review Fluids* **1**, 084002 (2016).
17. **Water impacting on superhydrophobic macrottextures.** Anaïs Gauthier, Sean Symon, Christophe Clanet & David Quéré. *Nature Communications* **6**, 8001 (2015).

18. Finite size effects on textured surfaces: recovering contact angles from vagarious drop edges. Anaïs Gauthier, Marco Rivetti, Jérémie Teisseire & Etienne Barthel. *Langmuir* **30**, 1544-1549 (2014).
19. Role of kinks in the dynamics of contact lines receding on superhydrophobic surfaces. Anaïs Gauthier, Marco Rivetti, Jérémie Teisseire & Etienne Barthel. *Physical Review Letters* **110**, 046101 (2013).

Patent

Brevet Français n° 20 13888. Dispositif pour mesurer localement une contrainte mécanique normale exercée par un élément de contact. *Inventeurs*: Mickaël Pruvost, Anaïs Gauthier & Annie Colin 11/08/2023

Invited seminars

2025	Surface du Verre et Interfaces	<i>Saint-Gobain Recherche, Aubervilliers, France</i>
2025	PMMH	<i>Paris, France</i>
2023	LPS	<i>Orsay, France</i>
2022	University of Massachusetts - Department of Physics (on-line)	<i>Armhest, États-Unis</i>
2021	Laboratoire Navier	<i>Marne la Vallée</i>
2020	Laboratoire SIMM	<i>ESPCI, Paris</i>
2020	CESAM	<i>Université de Lièges, Belgique</i>
2019	Laboratoire C3M	<i>ESPCI, Paris</i>
2019	Institut de Physique de Rennes	<i>Université de Rennes 1</i>
2018	Laboratoire MSC	<i>Université Paris Diderot, Paris</i>
2016	Physics of Fluids	<i>Université de Twente, Pays-Bas</i>
2016	Department of Mechanical and Process Engineering	<i>ETH Zurich</i>

Recent international conferences (as presenting author)

2025	* Droplets (poster)	<i>Liège, Belgique</i>
	Capillary attraction between particles in a soap film	
2024	* Journées de la Matière condensée (as invited speaker)	<i>Marseille, France</i>
	Gliding in a soap film	
	* Journées « Surfaces et Interfaces » (as invited speaker)	<i>Grenoble, France</i>
	Suspensions de particules non-browniennes	
2023	* 11th conference of the international Marangoni association	<i>Bordeaux, France</i>
	Inverse Marangoni instability of an ink droplet on a bath	
2022	* Journées de la matière condensée (invited speaker)	<i>Lyon, France</i>
	Phase separation and shear-thickening of cornstarch suspensions	
2021	* APS - March Meeting	<i>On-line symposium</i>
	Detection of heterogeneities in a shear thickening suspension through a local normal stress measurement	
	* Annual European Rheology Conference (AERC)	<i>On-line</i>
	Normal stress waves in shear thickening suspensions	
	* International Congress of Theoretical and Applied Mechanics (ICTAM)	<i>On-line</i>
	Normal stress waves in shear thickening suspensions	
2020	* Symposium on the Journal of Rheology special issue	<i>On-line symposium</i>
	« Physics of Dense Suspensions »	
	Pressure sensor array for a local normal stress measurement in complex fluids	

National conferences

2025	GDR MePhy	<i>Paris, France</i>
	Granular rafts on a soap bubble	
2022	* Groupe Français de Rhéologie	<i>Rennes, France</i>
	Phase separation and discontinuous shear-thickening of suspensions	