

# Paul BACONNIER

Postdoctoral researcher

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23/01/1996

## Education

2019-2023 **PhD Thesis**, *Gulliver*, ESPCI, Paris.

Title: *Active elastic solids: collective motion, collective actuation & polarization*. Funded by École Doctorale Physique en Île-de-France (ED 564), in collaboration with the Machine Materials Lab, University of Amsterdam. Advisor: Olivier Dauchot.

2018-2019 **MSc in Physics**, *École Normale Supérieure*, Paris.

ICFP Soft matter track. High-level fundamental physics courses on soft matter theory, equilibrium and out-of-equilibrium statistical physics, non-linear physics, fluids and solids mechanics.

- Master International Center for Fundamental Physics

2015-2019 **Engineering degree**, *ESPCI*, Paris.

École Supérieure de Physique et de Chimie Industrielles de la ville de Paris. Graduate engineering school of Physics, Chemistry and Biology.

- Master-level Diplôme d'ingénieur ESPCI Paris
- Advanced Master of Science and Technology

2013-2015 **Prep Classes**, *Lycée Fénelon*, Paris.

BSc equivalent program in Physics/Mathematics/Chemistry.

## Research experience

**Research Interests:** Statistical mechanics, solid mechanics, soft and active matter, disordered systems.

2023-2025 **Postdoc**, *AMOLF*, Amsterdam/Leiden.

Training & learning in mechanical metamaterials. Advisor: Martin van Hecke.

2019-2023 **PhD Thesis**, *Gulliver*, ESPCI, Paris.

Active elastic solids. Advisor: Olivier Dauchot.

2015-2017 **Team scientific project (PSE)**, ESPCI, Paris.

Stroboscopy and fluorescence lifetime with a fan. Advisors: Antonin Eddi, Emmanuel Fort, Suzie Protière.

2016-2019 **Internships**.

Gulliver laboratory with O. Dauchot (4 months, ESPCI, Paris, France), Van der Waals-Zeeman Instituut - Institute of Physics with D. Bonn (4 months, University of Amsterdam, The Netherlands), EDF R&D with S. Mimouni (6 months, Chatou, France).

## Publications

- [7] P. **Bacconnier**, D. Vincent, M. Aksil, and O. Dauchot, "Polarization-Induced Reentrance Transition in Active Solids," *In preparation*, 2024.
- [6] P. **Bacconnier**, D. Vincent, and O. Dauchot, "Noise-Induced Collective Actuation in Active Solids," *In preparation*, 2024.
- [5] C. Hernández López, P. **Bacconnier**, O. Dauchot, and G. Düring, "Stress-induced Collective Motion and Mode Selection in Active Solids," *In preparation*, 2024.
- [4] P. **Bacconnier**, D. Shohat, and O. Dauchot, "Discontinuous tension-controlled transition between collective actuations in active solids," *Physical Review Letters*, vol. 130, no. 2, p. 028 201, 2023.
- [3] P. **Bacconnier**, D. Shohat, C. H. López, C. Coulais, V. Démery, G. Düring, and O. Dauchot, "Selective and collective actuation in active solids," *Nature Physics*, vol. 18, no. 10, pp. 1234–1239, 2022.

- [2] S. Mimouni, P. **Baconnier**, and G. Davy, "Overview of mitigation models dedicated to severe accidents and consequences on flow rate through containment concrete structures," *Nuclear Science and Engineering*, 2021.
- [1] A. Eddi, P. **Baconnier**, M. Blons, S. Pautrel, S. Protière, and E. Fort, "Experimental teaching - a tribute to Yves Couder by the example: Stroboscopy and fluorescence lifetime with a fan," *Comptes Rendus. Mécanique*, vol. 348, no. 6-7, pp. 439-445, 2020.

## Conferences

### International conferences

- Mar. 2022 **APS March Meeting 2023**, *Contributed talk*, Las Vegas, USA.
- Mar. 2022 **APS March Meeting 2022**, *Contributed talk*, Chicago, USA.
- Mar. 2021 **APS March Meeting 2021**, *Contributed talk*, Virtual.
- Jul. 2021 **Cargèse summer school**, *Poster*, Cargèse, France.

### National conferences

- May. 2023 **33<sup>th</sup> Dutch Soft Matter Meeting**, *Invited talk*, Amsterdam, The Netherlands.
- Jan. 2023 **Les Journée de la Physique Statistique**, *Short talk*, Paris, France.
- Mar. 2022 **25<sup>th</sup> Rencontre du non-linéaire**, *Contributed talk*, Paris, France.
- Jan. 2022 **Les Journée de la Physique Statistique**, *Short talk*, Paris, France.
- Jan. 2020 **Les Journée de la Physique Statistique**, *Short talk*, Paris, France.
- Jun. 2018 **24<sup>th</sup> Dutch Soft Matter Meeting**, *Soundbite*, Leiden, The Netherlands.

### Workshops

- May. 2023 **CECAM - Pathways, Memory, and Emergent Computation in Nonequilibrium Systems**, *Contributed talk*, Sede Boqer, Israël.
- Jul. 2022 **PSL Soft and Living Matter days**, *Contributed talk*, Paris, France.
- Apr. 2020 **Autonomous behavior in robotic and living matter**, Virtual.
- Jun. 2021 **GDR MePhy - From Computational Fabrication to Material Design**, *Contributed talk*, Virtual.

### Lab seminars

**Talks**, LOMA (Bordeaux, France), AMOLF (Amsterdam, The Netherlands), Liphy (Grenoble, France), iLM (Lyon, France), LPENS (Lyon, France).

## Outreach

- Jun. 2022 **Outreach video**, *Selective and Collective Actuation in Active Solids*, ESPCI, Paris.
- Nov. 2021 **Live experiments**, *Conférence expérimentale*, ESPCI, Paris.
- Jan. 2020 **Chroniques Doctorales**, *PC Focus*, ESPCI, Paris.  
*Three Minute Thesis* ESPCI outreach contest.
- Oct. 2020 **Atelier Fresque du climat**, *Fête de la science*, ESPCI, Paris.  
Climate sciences popularization for kids.

## Teaching and supervision

### Teaching

- 2020-2022 **ESPCI**, BSc (2 × 2h).  
Tutorials of Linear systems: Analytical tools for linear systems analysis.
- 2020-2021 **ESPCI**, BSc (2 × 60h).  
Practical work of Thermodynamics: molecular dynamics, python, statistical physics.
- 2021-2022 **ESPCI**, BSc (1 × 36h).  
Practical work of Mechanics: machining, functional dimensioning.

### Supervision

2019-2022 **ESPCI.**

Co-supervision of M. Aksil, M. Vinteler, A Marché, H. Fabre, J. Craquelin and R. Troubat (BSc interns, 1-2 months), D. Shohat (MSc intern, 6 months).

2023-2025 **AMOLF.**

Co-supervision of T. Labrosse (BSc intern, 6 months).

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## Rewards

Mar. 2022 **GNSP PhD speaker award finalist**, *APS March Meeting*.  
500€.

Jan. 2021 **PC Focus Scientific photo contest**.  
Third and public prizes for my photo "*Excitations sonores dans un hexagone actif élastique*".

Jan. 2020 **PC Focus Chroniques Doctorales**.  
First prize of science popularization, 1500€.

Jan. 2019 **Excellence scholarship ESPCI Alumni**.  
Given to students for the excellence of their academic track, 5000€.

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## Academic & community service

2023 **Lab retreat organization**, *AMOLF*, Amsterdam.  
Scientific/educational program for a 1-week retreat.

2020-2022 **Student representative**, *Gulliver*, ESPCI, Paris.  
Representative of the non permanent members at the lab council.

### Seminars

2020-2022 **Organizer**, *Gulliver student seminar*, ESPCI, Paris.  
Weekly seminar for Gulliver graduate students and postdocs to develop presentation skills.

### Membership

2021-today **Société Française de Physique (SFP)**.

2021-today **American Physical Society (APS)**, *GNSP*, *DSOFT*.

2015-today **ESPCI Alumni**.