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Paul BACONNIER

Postdoctoral researcher

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 Corentin Coulais (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

Keywords: Statistical and nonlinear physics, mechanics, active matter, metamaterials, memory.

2023-2026 **Postdoc**, *AMOLF*, Amsterdam/Leiden
Memory effects and aging in driven amorphous materials. 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

h-index $= 6$, citations $= 318$, most cited $= 163$

[12] D. Shohat*, P. **Baconnier***, I. Procaccia, M. van Hecke, and Y. Lahini, "Aging of amorphous materials under cyclic strain", Proceedings of the National Academy of Sciences **123**, e2515075123 (2026).

[11] P. **Baconnier**, M. Aksil, V. Démery, and O. Dauchot, "Reentrant transition to collective actuation in active solids with a polarizing field", Physical Review Letters **135**, 188302 (2025).

[10] P. **Baconnier**, O. Dauchot, V. Démery, G. Düring, S. Henkes, C. Huepe, and A. Shee, "Self-aligning polar active matter", Reviews of Modern Physics **97**, 015007 (2025).

[9] P. **Baconnier**, V. Démery, and O. Dauchot, "Collective actuation in active solids in the presence of a polarizing field: a systematic analysis of the dynamical regimes", Physical Review E **112**, 045505 (2025).

[8] P. **Baconnier**, M. H. Teunisse, and M. van Hecke, "Dynamic self-loops in networks of passive and active binary elements", Physical Review Letters **135**, 207402 (2025).

[7] S. Mohanty*, P. **Baconnier***, H. A. H. Schomaker, A. Comoretto, M. van Hecke, and J. T. B. Overvelde, "Multimodal motion and behavior switching of multistable ciliary walkers", arXiv preprint:2512.09840 (2025).

[6] P. **Baconnier**, D. Vincent, and O. Dauchot, "Noise-Induced Collective Actuation in Active Solids", Physical Review E **109**, 024606 (2024).

[5] C. Hernández-López, P. **Baconnier**, C. Coulais, O. Dauchot, and G. Düring, "Model of active solids: rigid body motion and shape-changing mechanisms", Physical Review Letters **132**, 238303 (2024).

[4] P. **Baconnier**, D. Shohat, and O. Dauchot, "Discontinuous tension-controlled transition between collective actuations in active solids", Physical Review Letters **130**, 028201 (2023).

[3] P. **Baconnier**, D. Shohat, C. Hernández-López, C. Coulais, V. Démery, G. Düring, and O. Dauchot, "Selective and collective actuation in active solids", Nature Physics **18**, 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 **348**, 439–445 (2020).

Review service

Physical Review Letters, Physical Review X, Physical Review E, Soft Matter, Traffic and Granular Flow Conference (TGF2024).

Conferences

International conferences

Jun. 2025 **Functionality Through Nonlinearity**, *Poster*, London, United Kingdom

May. 2025 **Mechanical Computing Meeting**, *Poster*, AMOLF, Netherlands

May. 2025 **Infomatter Symposium: Fundamentals of Computing in Matter**, *Poster*, AMOLF, Netherlands

Feb. 2025 **École de physique des Houches**, *Contributed talk*, Les Houches, France

Mar. 2024 **APS March Meeting 2024**, *Long contributed talk*, Minneapolis, USA

Oct. 2023 **Rising Stars in Soft and Biological Matter symposium**, *Contributed talk*, virtual

Mar. 2023 **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

Oct. 2024 **Journées de la Matière Condensée 2024**, *Contributed talk*, Marseille, France

May. 2023 **33rd Dutch Soft Matter Meeting**, *Invited talk*, Amsterdam, The Netherlands

Jan. 2023 **Journées de la Physique Statistique**, *Short talk*, Paris, France

Mar. 2022 **25^{e} 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 **24th Dutch Soft Matter Meeting**, *Soundbite*, Leiden, The Netherlands

Workshops

Dec. 2025 **Slender and Active Mechanics of Emerging Materials and Systems**, *Contributed talk*, Edinburgh, United Kingdom

May. 2025 **Non-Reciprocity Across Scales**, *Contributed talk*, University of Amsterdam, Netherlands

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 **Automous behavior in robotic and living matter**, Virtual

Jun. 2021 **GDR MePhy - From Computational Fabrication to Material Design**, *Contributed talk*, Virtual

Lab seminars

Talks, Gulliver (Paris, France), AMOLF (Amsterdam, The Netherlands), LOMA (Bordeaux, France), Liphy (Grenoble, France), iLM (Lyon, France), LPENS (Lyon, France), IRPHE/IUSTI (Marseille, France), MSC (Paris, France), LPENS (Paris, France)

Outreach

Oct. 2025 **AMOLF open day**, *Stand with educational scientific experiments*, AMOLF, Amsterdam

Oct. 2023 **Leiden family day**, *Stand with educational scientific experiments*, Leiden university, Leiden

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 x 2h)
Tutorials of Linear systems: Analytical tools for linear systems analysis.

2019-2021 **ESPCI**, BSc (2 x 60h)
Practical work of Thermodynamics: molecular dynamics, python, statistical physics.

2021-2022 **ESPCI**, BSc (1 x 72h)
Practical work of Mechanics: machining, functional dimensioning.

2018-2020 **Private lessons in physics for bachelor students**, 100h

Supervision

2019-2022 **ESPCI**
Co-supervision of M. Aksil, M. Vinteler, A Marché, H. Fabre, J. Craquelin and R. Troubat (BSc interns, 1-3 months), D. Shohat (MSc intern, 6 months).

2023-2025 **AMOLF**
Co-supervision of T. Labrosse, A. Hoekstra, E. Terme (MSc interns, 4-6 months).

Rewards and grants

Feb. 2026 **NWO Scientific Meetings and Consultations 2026**, *NWO*
Financial support for the "Multistable Active Matter" meeting, 4000€.

Aug. 2025 **Claudine Hermann prize 2023**, *Société Française de Physique (SFP)*
Awarded to young researchers for outstanding PhD work in condensed matter physics.

Mar. 2022 **GNSP PhD speaker award finalist**, *APS March Meeting*
Selected in the final three candidates who gave a talk at the award session, 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€.

Jul. 2019 **Doctoral scholarship**
From the doctoral school EDPIF (Physics in Île-de-France), 100000€

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

Academic & community service

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

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

Conferences

Apr. 2026 **"Multistable Active Matter" meeting**, *AMOLF*, Amsterdam
Main organizer of a two-days meeting with around 60 participants (budget = 12000€).

Seminars

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

Membership

SFP, APS (GSNP, DSOFT), ESPCI Alumni

Interests

Combat sports Judo, ju-jitsu, muay thai, kickboxing
Biking Maintenance, travelling and commuting around

Academic references

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