

Currently “Chargée de Recherche” CNRS @**Sorbonne University**, I am interested in **transport processes in soft matter**, at the micro to nanoscale where exotic phenomena emerge. I investigate, with advanced mathematics and physics tools, in collaboration with experiments, how to harvest these phenomena for macroscopic transport, with applications in filtration and in soil science. I lead a group of 2-4 people.

<http://wigglylab.marbach.fr/>

Paris, France, +33 6 74 55 57 41, sophie.marbach@cnrs.fr

RESEARCH - transport at the microscale in physical systems



Chargée de Recherche CNRS - Sorbonne University

September 2022

Tenured position; Countoscope to quantify dynamics + Physics of transport in soil projects.



Marie Skłodowska Curie Fellow - New York & Sorbonne University

2020 - 2023

3 year independent position; project “MolecularControl”: models for molecular transport



Courant Instructor - New York University - New York, USA

2019- 2020

Multiscale **transport models** - with Aleksandar Donev, Miranda Holmes-Cerfon.



Ph.D. - Ecole normale supérieure - Paris, France

2015 - 2018

director: **Lydéric Bocquet** : Nanofluidic transport models. Defense: June 15th, 2018



Total - Paris, France, R&D Model for defect transport in Silicon solar cells

2015

Master's THESIS (#2) - Institut Curie - France - Model of cellular motility

2014

Master's THESIS (#1) - Harvard University - USA - Model for doping of solar cells

2013

International Collaborations



Collaboration with **Colorado School of Mines - Colorado, USA**

Since 2021

Brennan Sprinkle: Numerics for the **Countoscope** + co-mentoring (G. Mattingly) (2 pub.)



Collaboration with **Oxford University - UK**

Since 2021

Alice Thorneywork: Experiments for the **Countoscope** + rationalizing **transport signatures in nanopores** + co-mentoring (A. Drummond) (2 pub.)



Collaboration with **Technische Universität München - Germany**

2013 - 2023

Karen Alim : Modeling **transport in a slime mold network**. (4 pubs)

30 peer-reviewed international publications + 1 preprint:

full list: <https://wigglylab.marbach.fr/publications.html>

Google Scholar: <https://scholar.google.fr/citations?user=-vDkpaMAAAAJ&hl=fr&oi=ao>

AWARDS

- **Outstanding APS referee (2021)** <https://journals.aps.org/OutstandingReferees>
- **Rising Stars in Soft and Biological Soft Matter (2020)** (Research award from U. Chicago)
- **l'Oréal-UNESCO for Women in Science (2017)** (20 Ph.D. Prizes/year in FR with independent academic jury)
- **1st national prize at Falling Walls Lab (2017)** (Public outreach/entrepreneurship presentation)
- **Jean-Pierre Aguilar grant (2015-2018)** (Highly selective Ph.D. grant from the CFM Foundation)

TEACHING



Undergraduate level, New York University - General math classes

2019 - 2020



Undergraduate level, École Normale Supérieure & Lycée Louis-le-Grand

2013 - 2018

STUDENT MENTORING

Past mentoring: 6 masters+2 PhD students. Currently, I am mentoring:

Sophie Hermann

PostDoc (2024-2026)

Mathematical modeling of physical identities related to transport properties in molecular systems

Adam Carter

Ph.D. student (2023-2026)

Mathematical modeling and numerical investigations of transport in soils

Tristan Cerdin (French co-mentor: C. Douarche)

Ph.D. student (2024-2027)

Mathematical equations for fluctuating counts in boxes of active particles

ACADEMIC RESPONSIBILITIES

Major Grants received

- 
- **Marie Skłodowska Curie Individual Fellowship (2024-2026)** (~200 k€ as supervisor for a postdoctoral fellow, here Sophie Hermann; distinct topic from MicroRoad)
 - **Materials' Institute of Sorbonne University PhD grant (2023-2026)** (~130 k€ as supervisor for a Ph.D. student, here Adam Carter; on studying transport in soil, complementary to MicroRoad)
 - **Marie Skłodowska Curie Individual Fellowship (2020-2023)** (~250 k€ personal research grant for a collaboration between NYU and Paris Sorbonne, on modeling transport of molecular systems)

Committees

- **PhD committees:** 2024 B. Coquinot (ENS Paris), L. Fogouang (U. Orléans), 2023 I. Einsele (ENS Paris) 2022 N. Timmerhuis (U. of Twente), A. Hardiagon (U. Paris Cité)
- **Scientific committee member**, Scientific projects awards at **École Polytechnique (2022)**

Peer-review contributions Regular Referee for major international journals (~15/year) (**Physical review:** PRL, PRE, PRX, PRF, **PNAS, Nature Physics, Nature Comm;** J. Chem. Phys., **Journal of Fluid Mechanics**)

Administrative responsibilities:

- Co-organizer of CECAM Dynamics of nonequilibrium variables (Sept. 2025)
- Co-organizer IntCha24 conference 2024, **100 participants** (<https://www.pks.mpg.de/intcha24>)

COMMUNICATION

115 talks: 56 international conferences (incl. 24 invited talks) + 59 invited seminars. Selected list:

Invited international conferences with oral contribution:

- **Erwin Schrödinger Institute - Workshop on Transport in Soft Matter** - Vienna, Austria (2024)
- **Nanofluidics 2024** - Lenzerheide, Switzerland (2024)
- **GRS - Colloidal, Macromolecular and Polyelectrolyte solutions** - Ventura, USA (2022)
- **Telluride - Nuclear Pore Complexes and Smart Polymers** - Telluride, USA (2022)
- **SIAM Computational Science & Engineering** - Texas, USA (2021)
- **Meco 44** - Key Challenges in Statistical Physics - Munich, Germany (2019)
- **GRC Water and Aqueous Electrolytes** - New Hampshire, USA - (2018)

Examples of invited seminars:

Curie Institute (Paris, 2024), **ETH** (Zurich, Switzerland, 2023) **Korean Institute of Technology** (Korea, 2023) **Princeton University** (USA, 2022), **MIT** (USA, 2022) **Lennard-Jones Center** (Cambridge, UK, 2022), **Ecole Polytechnique** (Paris, France, 2021), **EPFL** (Switzerland, 2021), **Brown University** (USA, 2021)

Outreach

Popularized publications (Twitter threads on science <https://twitter.com/MarbachSophie> +1 blog (<http://sciriousgecko.com>) + 2 self-written articles + 8 written after journalists interviews incl. Le Monde)
Regular contribution to general public conferences + YouTube Channel