

# Juliette Monsel

*Researcher in theoretical physics*

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Nationality: French

*Research interests: stochastic thermodynamics, quantum open systems, quantum optics, optomechanics and electronic transport.*

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## Education

- 2019 **Ph.D.**, *Université Grenoble Alpes*, France.  
Theoretical Physics.
- 2016 **M.Sc.**, *École Normale Supérieure de Lyon*, France.  
Major: Physics, Mention: highest honors
- 2014 **B.Sc.**, *École Normale Supérieure de Lyon*, France.  
Major: Physics, Mention: highest honors
- 2011 – 2013 **Classe Préparatoire**, *Lycée La Martinière Monplaisir*, Lyon, France.  
Two-year intensive course preparing for the competitive entrance examinations to French leading institutions of higher education. Track: Mathematics-Physics.

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## Research experience

- 2020 – current **Postdoctoral researcher**, *Department of Microtechnology and Nanoscience, Chalmers University of Technology*, Gothenburg, Sweden.  
Advisor: Janine Splettstoesser. Quantum thermodynamics.
  - Studied thermodynamic of electronic transport
  - Analyzed optomechanical cooling in a thermodynamic perspective
- 2019 – 2020 **Postdoctoral researcher**, *Institut Néel*, Grenoble, France.  
(4 months) Advisor: Alexia Auffèves. Quantum thermodynamics and optomechanics.
  - Explored the potential of carbon nanotubes for thermodynamic experiments
  - Studied stochastic thermodynamics with Kerr resonators
- 2016 – 2019 **Doctoral researcher**, *Institut Néel*, Grenoble, France.  
(3 years, 2 months) Supervisor: Alexia Auffèves. Quantum thermodynamics and optomechanics.
  - Demonstrated the potential of hybrid optomechanical systems and one-dimensional atoms to experimentally explore quantum thermodynamics
  - Proposed methods to define and measure work in the quantum regime
- 2016 **Master intern**, *Institut Néel*, Grenoble, France.  
(4 months) Supervisor: Alexia Auffèves. Fluctuation theorems in a hybrid optomechanical system.
- 2015 **Master intern**, *Institut Néel*, Grenoble, France.  
(3 months) Supervisor: Alexia Auffèves. Hybrid optomechanical system in the ultra-strong coupling regime.
- 2014 **Bachelor intern**, *Institut Lumière Matière*, Lyon, France.  
(2 months) Supervisor: Julien Laverdant. Experimental control of polarization with a spatial light modulator.

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## Teaching experience

- 2017, 2018 (64 hours/year) **Teaching Assistant**, *Université Grenoble Alpes*, France.  
Newtonian mechanics for first year undergraduates.
- Supervised students during tutorials ( $2 \times 1.5$  hours/week,  $\sim 30$  students) and practical work (3 hours/week,  $\sim 15$  students)
  - Graded examinations and practical work reports
  - Wrote exercises for the examinations
- 2013 – 2014 (7 months) **Tutor for homework assistance**, *Trait d'Union program*, Villeurbanne, France.  
Took part in a homework assistance program for students from high schools in disadvantaged areas (2 hours/week).

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## Publications

- Preprint F. Vigneau, J. Monsel, J. Tabanera, L. Bresque, F. Fedele, A. Briggs, J. Anders, J. M. R. Parrondo, A. Auffèves, N. Ares, *Ultrastrong coupling between electron tunneling and mechanical motion*. arXiv: 2103.15219.
- 2021 J. Monsel, N. Dashti, S. K. Manjeshwar, J. Eriksson, H. Ernbrink, E. Olsson, E. Torneus, W. Wieczorek, J. Splettstoesser, "Optomechanical cooling with coherent and squeezed light: The thermodynamic cost of opening the heat valve," *Physical Review A*, **103**, 063519.
- 2020 J. Monsel, *Quantum Thermodynamics and Optomechanics*, ser. Springer Theses, Recognizing Outstanding Ph.D. Research. Springer International Publishing.
- J. Monsel, M. Fellous-Asiani, B. Huard, A. Auffèves, "The Energetic Cost of Work Extraction," *Physical Review Letters*, **124**, 130601.
- 2018 J. Monsel, C. Elouard, A. Auffèves, "An autonomous quantum machine to measure the thermodynamic arrow of time," *npj Quantum Information*, **4**, 59.

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## Awards and Grants

- 2020 Springer Thesis Award, recognizing outstanding Ph.D. research
- 2016 Ph.D. grant from the CFM Foundation for Research

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## Conferences and seminars

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### Seminars and invited talks

- 2021 J. Monsel, N. Dashti, S. K. Manjeshwar, J. Eriksson, H. Ernbrink, E. Olsson, E. Torneus, W. Wieczorek, J. Splettstoesser, "Optomechanical cooling with coherent and squeezed light: The thermodynamic cost of opening the heat valve," *NanoThermodynamics seminar*, Lund University, Lund, Sweden.
- 2019 J. Monsel, C. Elouard, M. Richard, A. Auffèves, "Thermodynamics of hybrid optomechanical systems," *Seminar, invited by Janine Splettstoesser*, Department of Microtechnology and Nanoscience, Chalmers University of Technology, Gothenburg, Sweden.
- J. Monsel, C. Elouard, A. Auffèves, "An autonomous quantum machine to measure the thermodynamic arrow of time," *Workshop on Quantum Networks and Non-equilibrium Systems*, Obergurgl, Austria.

- 2018 —, “Fluctuation theorems in a hybrid optomechanical system,” *Seminar, invited by Natalia Ares*, Department of Materials, Oxford University, United Kingdom.

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### Contributed talks

- 2021 J. Monsel, N. Dashti, S. K. Manjeshwar, J. Eriksson, H. Ernbrink, E. Olsson, E. Torneus, W. Wiecek, J. Splettstoesser, “Optomechanical cooling with coherent and squeezed light: the thermodynamic cost of opening the heat valve,” *Condensed matter days (JMC)*, Online (Rennes, France).
- , “Optomechanical cooling with coherent and squeezed light: the thermodynamic cost of opening the heat valve,” *Thermodynamics and Information in the Quantum Regime*, Online.
- , “Optomechanical cooling with coherent and squeezed light: The thermodynamic cost of opening the heat valve,” *Joint European Thermodynamics Conference*, Online (Prague, Czech Republic).
- 2020 J. Monsel, M. Fellous-Asiani, B. Huard, A. Auffèves, “The energetic cost of work extraction,” *Annual Quantum Thermodynamics conference*, Online.
- 2019 J. Monsel, C. Elouard, M. Richard, A. Auffèves, “An autonomous optomechanical energy converter,” *Annual Meeting of the GDR MecaQ (Quantum Optomechanics, Nanomechanics)*, Palaiseau, France.
- J. Monsel, C. Elouard, A. Auffèves, “An autonomous quantum machine to measure the thermodynamic arrow of time,” *Annual Quantum Thermodynamics conference*, Espoo, Finland.
- , “Measuring the arrow of time in a hybrid optomechanical system,” *II Workshop on Quantum Information and Thermodynamics*, Natal, Brazil.
- 2018 J. Monsel, C. Elouard, M. Richard, A. Auffèves, “Energy conversion in a hybrid optomechanical system: Laser-like behavior and cooling,” *Condensed matter days (JMC)*, Grenoble, France.
- 2017 J. Monsel, C. Elouard, A. Auffèves, “Fluctuation theorems in a hybrid optomechanical system,” *Annual colloquium of the GDR IQFA (Quantum Engineering, from Fundamental Aspects to Applications)*, Nice, France.
- , “Measuring the arrow of time in a hybrid optomechanical system,” *VI Quantum Information Workshop*, Paraty, Brazil.
- , “Thermodynamics and hybrid optomechanical system,” *Congress of the French Physical Society*, Orsay, France.

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### Posters

- 2020 J. Monsel, N. Dashti, S. K. Manjeshwar, J. Splettstoesser, W. Wiecek, “Optomechanical cooling efficiency: The cost of turning a valve,” *Quantum Technology International Conference*, Online (Barcelona, Spain).
- J. Monsel, M. Fellous-Asiani, B. Huard, A. Auffèves, “The energetic cost of work extraction,” *Workshop on Prospects of Ultrastrong light-matter interactions*, Gothenburg, Sweden.

2017 J. Monsel, C. Elouard, A. Auffèves, “Measuring the arrow of time in a hybrid optomechanical system,” *VI Quantum Information School*, Paraty, Brazil.

——, “Measuring the arrow of time in a hybrid optomechanical system,” *Annual Quantum Thermodynamics conference*, Oxford, United Kingdom.

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## Skills

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### Languages

English fluent  
French native speaker  
Italian good oral and written comprehension  
Swedish currently learning (A2)

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### Computer

Programming Python, Git, Matlab, C++  
Operating systems Linux, Windows, MacOS  
Text processing  $\text{\LaTeX}$ , LibreOffice

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## Service to the community

Reviewer Phys. Rev. E (2021), J. Phys. A Math. (2021), New J. Phys. (2020), Commun. Phys. (2020)  
Fête de la Science Speaker and guide (2016 – 2019) at the “Fête de la Science”, a yearly national French event during which scientific institutions promote science through animations and laboratory tours.

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## Volunteer experience

2020 – current **Cykelköket**, Gothenburg, Sweden.  
The “Bike kitchen” is an open Do-It-Yourself bicycle workshop.

- Helped people repair their bikes
- Took part in the administration of the workshop as a board member

  
2017 – 2020 **uN p’Tit véLo dAnS La Tête**, Grenoble, France.  
Associative self-repair workshop aiming at teaching bicycle mechanics and promoting bike riding.

- Learned bicycle mechanics by dismantling and repairing bikes for the association
- Explained to members of the association how to repair their bikes
- Took part in meetings and helped organize events as a member of the board from September 2018 to February 2020

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## Interests

Reading novels, mostly mysteries, in French (Fred Vargas) and in English (Michael Connelly, Peter Robinson)  
Sports hiking, cycling  
Programming *open-source software* development, answering questions on *StackOverflow*