

Juliette Monsel

Researcher in theoretical physics

Gothenburg, Sweden

✉ monsel@chalmers.se

📄 j4321.github.io/juliette.monsel

🆔 0000-0002-4965-6794

📄 AAH-5591-2020

Nationality: French

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

Education

- 2020 **Qualification**, *National Council of Universities (CNU)*, France.
Certificate allowing me to apply to “Maître de Conférence” positions, permanent Assistant Professor positions with an important teaching component, at French universities.
- 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.

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.

Teaching experience

- 2017, 2018 **Teaching Assistant**, *Université Grenoble Alpes*, France.
(64 hours/year) Newtonian mechanics for first year undergraduates.
- Supervised students during tutorials ($2 \times 1,5$ hours/week, ~ 30 students) and practical work (3 hours/week, ~ 15 students)
 - Graded examinations and practical work reports
 - Wrote exercises for the examinations
- 2013 – 2014 **Tutor for homework assistance**, *Trait d'Union program*, Villeurbanne, France.
(7 months) Took part in a homework assistance program for students from high schools in disadvantaged areas (2 hours/week).

Student supervision

- Starting in Oct. Co-supervisor of the master student Juliane Graf from University of Regensburg
2021 (Germany) at MC2, Chalmers University of Technology for a six-month project.
- 2020 – current Official assistant supervisor of the Ph.D. student Ludovico Tesser at MC2,
Chalmers University of Technology.
- 2016 Informal co-supervisor of the master student Cauê Moreno Kersul de Castro
Carvalho during his two-month internship at the Institut Néel, Grenoble, France.

Training

- 2017 **How to develop as a teacher**, *Doctoral school of Physics*, Grenoble, France.
Two-day training program on communication and group animation techniques for teaching.
- 2016 – 2019 **Research and Higher Education (RES) label**, *Doctoral school of Physics*,
Grenoble, France.
Teaching oriented Ph.D. program leading to the production of a portfolio documenting the development of my teaching and research skills (in French): <http://juliette-monsel.byethost15.com>.
- 2016 **Introduction to the profession of teacher-researcher**, *Doctoral school of Physics*, Autrans, France.
Three-day workshop on topics related to teaching at the university.

Awards and Grants

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

Publications

Articles

- 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, 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.

Books

- 2020 J. Monsel, *Quantum Thermodynamics and Optomechanics*, ser. Springer Theses, Recognizing Outstanding Ph.D. Research. Springer International Publishing.

Conferences and seminars

Invited talks

- 2019 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*, invited by Andrew Briggs and Natalia Ares, Obergurgl, Austria, Jan. 16 – 19. Website: <http://www.ati.ac.at/~obergurgl2019>.

Contributed 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," *Annual Quantum Thermodynamics Conference*, Online (Genève, Switzerland), Oct. 4 – 8. Website: <https://qtd2021.ch>.

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," *Condensed matter days (JMC)*, Online (Rennes, France), Aug. 24 – 27. Website: <https://jmc17.sciencesconf.org>.

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," *Thermodynamics and Information in the Quantum Regime*, Online, Jul. 7 – 9. Video: <https://www.youtube.com/watch?v=5BT9kkFDPCQ>.

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," *Joint European Thermodynamics Conference*, Online (Prague, Czech Republic), Jun. 14 – 18. Website: <https://www.jetc2021.eu>.

- 2020 J. Monsel, M. Fellous-Asiani, B. Huard, A. Auffèves, "The energetic cost of work extraction," *Annual Quantum Thermodynamics Conference*, Online (Barcelona, Spain), Oct. 13 – 17. Video: <http://qtd2020.icfo.eu/index.php/2020/10/08/juliette-monsel/>.

- 2019 J. Monsel, C. Elouard, M. Richard, A. Auffèves, “An autonomous optomechanical energy converter,” *Annual Meeting of the GDR MecaQ (French research network on Quantum Optomechanics, Nanomechanics)*, Palaiseau, France, Oct. 3 – 4. Website: <https://mecaqcolloq2019.sciencesconf.org/>.
- J. Monsel, C. Elouard, A. Auffèves, “An autonomous quantum machine to measure the thermodynamic arrow of time,” *Annual Quantum Thermodynamics Conference*, Espoo, Finland, Jun. 23 – 28. Website: <https://qtd2019.aalto.fi/>.
- J. Monsel, C. Elouard, A. Auffèves, “Measuring the arrow of time in a hybrid optomechanical system,” *II Workshop on Quantum Information and Thermodynamics*, Natal, Brazil, Mar. 11 – 22. Video: <https://www.youtube.com/watch?v=jhz0Az8H2UU>.
- 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, Aug. 27 – 31. Website: <https://jmc2018.sciencesconf.org/>.
- 2017 J. Monsel, C. Elouard, A. Auffèves, “Fluctuation theorems in a hybrid optomechanical system,” *Annual colloquium of the GDR IQFA (French research network on Quantum Engineering, from Fundamental Aspects to Applications)*, Nice, France, Nov. 29 – Dec. 1.
- J. Monsel, C. Elouard, A. Auffèves, “Measuring the arrow of time in a hybrid optomechanical system,” *VI Quantum Information Workshop*, Paraty, Brazil, Aug. 21 – 25.
- J. Monsel, C. Elouard, A. Auffèves, “Thermodynamics and hybrid optomechanical system,” *Congress of the French Physical Society (SFP)*, Orsay, France, Jul. 3 – 7. Website: <https://congressfp.sciencesconf.org>.

Invited seminars

- 2021 J. Monsel, “Quantum thermodynamics,” *SmallTalks [about Nanoscience]*, MC2, Chalmers University of Technology, Dec. 6. Website: https://www.chalmers.se/en/research/strong/nano/calendar/Pages/ei_nano_seminar_6_dec.aspx.
- J. Monsel, “Optomechanical cooling with coherent and squeezed light: The thermodynamic cost of opening the heat valve,” *NanoThermodynamics seminar, invited by Peter Samuelsson*, Online (Lund University), Mar. 19.
- 2019 J. Monsel, “Thermodynamics of hybrid optomechanical systems,” *Seminar, invited by Janine Splettstoesser*, Department of Microtechnology and Nanoscience, Chalmers University of Technology, Gothenburg, Sweden, Sep. 11.
- 2018 J. Monsel, “Fluctuation theorems in a hybrid optomechanical system,” *Seminar, invited by Natalia Ares*, Department of Materials, University of Oxford, UK, Mar. 7.

Contributed posters

2020 J. Monsel, N. Dashti, S. K. Manjeshwar, J. Splettstoesser, W. Wieczorek, "Optomechanical cooling efficiency: The cost of turning a valve," *Quantum Technology International Conference*, Online (Barcelona, Spain), Nov. 2 – 4. Website: <https://premc.org/conferences/qtech-quantum-technology/>.

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, Sep. 13 – 17.

2017 J. Monsel, C. Elouard, A. Auffèves, "Measuring the arrow of time in a hybrid optomechanical system," *VI Quantum Information School*, Paraty, Brazil, Aug. 14 – 18.

J. Monsel, C. Elouard, A. Auffèves, "Measuring the arrow of time in a hybrid optomechanical system," *Annual Quantum Thermodynamics Conference*, Oxford, United Kingdom, Mar. 13 – 17.

Service to the community

Reviewer Phys. Rev. E (2021), J. Phys. A Math. (2021), New J. Phys. (2020), Commun. Phys. (2020)

Scientific outreach 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 aimed at high school students and the general public.

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

Skills

Languages

English fluent

CLES 2 certificate of B2 level

French native speaker

Italian good oral and written comprehension

Swedish currently learning

following B1 course at Chalmers

Computer

Programming Python, Git, Matlab, C++

Operating systems Linux, Windows, MacOS

Text processing \LaTeX , LibreOffice

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*