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.

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.

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 (4 months) **Postdoctoral researcher**, *Institut Néel*, Grenoble, France.
Advisor: Alexia Auffèves. Quantum thermodynamics and optomechanics.
- Explored the potential of carbon nanotubes for thermodynamic experiments
- Studied stochastic thermodynamics with Kerr resonators

2016 – 2019 (3 years, 2 months) **Doctoral researcher**, *Institut Néel*, Grenoble, France.
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 (4 months) **Master intern**, *Institut Néel*, Grenoble, France.
Supervisor: Alexia Auffèves. Fluctuation theorems in a hybrid optomechanical system.

2015 (3 months) **Master intern**, *Institut Néel*, Grenoble, France.
Supervisor: Alexia Auffèves. Hybrid optomechanical system in the ultra-strong coupling regime.

2014 (2 months) **Bachelor intern**, *Institut Lumière Matière*, Lyon, France.
Supervisor: Julien Laverdant. Experimental control of polarization with a spatial light modulator.

Teaching experience

2017, 2018 (64 hours/year) **Teaching Assistant**, *Université Grenoble Alpes*, France.
Newtonian mechanics for first year undergraduates.
- Supervised students during tutorials (2×1,5 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 (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).

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," *Phys. Rev. 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.

Awards and Grants

2020 Spinger Thesis Award, recognizing outstanding Ph.D. research

2016 Ph.D. grant from the CFM Foundation for Research

Conferences and seminars

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.

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," *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 (Pragues, 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.

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).

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.

Skills

Languages

English fluent

French native speaker

Italian good oral and written comprehension

Swedish currently learning (A2)

Computer

Programming Python, Git, Matlab, C++

Operating systems Linux, Windows, MacOS

Text processing LaTeX, LibreOffice

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.

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

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*