

HENNI OUERDANE, PH. D.

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POST-GRADUATE EDUCATION AND QUALIFICATIONS

- Université de Caen Normandie Caen, France
Postgraduate Master's degree in European project management October 2015 - September 2016
Main topics covered: Bid writing, European funds (H2020, Interreg, ...) project management, institutional law, and stakeholder management
- Heriot-Watt University - Semiconductor Theory Group Edinburgh, Scotland
Doctor of Philosophy degree in physics October 1998 - November 2001
Influence of Ultrafast Carrier Dynamics on Semiconductor Absorption Spectra Viva passed 16 January 2002
- Université de Cergy-Pontoise Cergy-Pontoise, France
Master of Advanced Studies in statistical physics 1996 - 1997
Major in disordered materials

WORK EXPERIENCE

◇ RESEARCH WORKS

- Skolkovo Institute of Science and Technology (Skoltech) Moscow, Russian Federation
Assistant Professor - *Energy conversion physics and technology* April 2018 – present
Leading Research Scientist - *Integration and control of heat and power systems with variable loads; finite-time thermodynamics and thermoelectricity* February 2017 – March 2018
- Russian Quantum Center – Quantum polaritonics group Moscow, Russian Federation
Visiting Professor - *Thermodynamics of thermoelectricity near phase transitions, fluctuation Cooper pairs* July 2014 - September 2014
- Laboratoire Interdisciplinaire des Energies de Demain (Paris Diderot) Paris, France
Affiliated Researcher - *Finite-time thermodynamics of thermoelectric systems and energy conversion process in macroscopic and mesoscopic systems* February 2014 - September 2015
- CRISMAT and CNRT Matériaux laboratories, CNRS Caen, France
Senior Research Associate - *Thermodynamics of thermoelectric systems: optimization of the working conditions of thermogenerators and refrigerators, and participation to two industrial projects: CERES-2 and SYSPACTE* February 2011 - January 2014
- CIMAP laboratory, CNRS Caen, France
Senior Research Associate - *Radiolysis of water in mesoporous silica: Monte Carlo simulation of electron transport in heterogeneous media,* September 2008 - March 2010
- LASMEA laboratory, CNRS Clermont-Ferrand, France
Research Associate - *Microcavity exciton-polaritons: phase diagrams, superfluidity, scattering theory of composite bosons* October 2006 - August 2008
- Laboratoire de Cristallographie et Sciences des Matériaux (CRISMAT) Caen, France
Temporary Lecturer - *Theory of strongly correlated electron systems: Single impurity Anderson model, functional integrals and slave bosons* September 2004 - August 2006
- Tyndall National Institute - Condensed Matter Theory Group Cork, Ireland
Research Associate - *Electron mobility, alloy disorder, dilute nitrides* February 2004 - August 2004
- University of Glasgow - Computing Science Department Glasgow, Scotland
Research Associate - *Collisions of ultra-cold alkali and hydrogen atoms, development of numerical methods for low-energy scattering computation* October 2002 - November 2003

◇ SUPERVISION OF POSTDOCTORAL RESEARCHERS
★ Skolkovo Institute of Science and Technology

Moscow, Russia

- **Supervision** of Dr. Vasily Artemov October 2018 - April 2021
Dielectric spectroscopy of water and aqueous solutions for energy applications
- **Supervision** of Dr. Yuriy Lyulin September 2018 - September 2020
Integration and control of heat and power systems with variable loads
- **Supervision** of Dr. Alexander Ryzhov July 2017 - December 2019
Integration and control of heat and power systems with variable loads

★ CNRT Matériaux and CRISMAT laboratories, CNRS

Caen, France

- **Co-supervision** of Dr. Adel Abbout April 2012 - March 2013
Thermoelectric transport in mesoscopic systems

◇ TEACHING AND STUDENT SUPERVISION

★ Skolkovo Institute of Science and Technology

Moscow, Russia

- **Two 6-credit graduate courses** Energy Systems Master October. 2018 - present
Energy systems physics and engineering - course code MA06001
Nonequilibrium processes in energy conversion - course code MA06200
- **PhD supervision** of Dmitry Smirnov – PhD **defended** July 2017 - Oct. 2019
Innovative technological pathway for new commercial applications of Stirling cycle-based systems
- **PhD supervision** of Ilia Luchnikov – Aspirantura **defended** - grade A April 2018 - Oct. 2021
Prediction and control of complex systems dynamics
- **PhD supervision** of Behnam Mohseni November 2019 - present
Novel heat production and management solutions
- **PhD supervision** Ilia Khomchenko November 2020 - present
Control and conversion of heat in mesoscopic systems
- **PhD supervision** Javier Penuela November 2021 - present
Electrical power optimization for vertical agriculture
- **Master supervision** Airat Kotlyar-Shapiro – **defended** - grade B October 2018 - June 2019
Ultramicroelectrode array-based gas sensors for air quality assessment and microclimate control
- **Master supervision** Ilia Khomchenko – **defended** - grade A January 2019 - June 2020
New path for thermoelectric conversion technology: a thermodynamics approach
- **Master supervision** Valeriy Shevchenko – **defended** - grade A January 2019 - June 2020
Design and manufacturing of novel vapor chamber for the cooling of power and microelectronic devices
- **Master supervision** Roman Doronin – **defended** - grade B January 2019 - June 2020
Study of the charge storage capacity of the water-air interface
- **Master supervision** Regina Khurmatova – **defended** - grade A January 2020 - June 2021
Pure vapour film-wise condensation in flattened tubes for heat transfer enhancement
- **Master supervision** Javier Penuela – **defended** - grade A January 2020 - June 2021
Indoor agriculture electricity needs: a demand response analysis
- **Master supervision** Svetlana Ponomarenko January 2021 - present
Charge separation and accumulation in a pure-water-based supercapacitors
- **Master supervision** Collins Ogbodo January 2021 - present
Development of digital twin of a phytotron for decision support and monitoring of indoor agriculture
- **Master supervision** Olalekan Omoyele January 2021 - present
Optimization of district heating systems considering the pipe network and thermal inertia of buildings
- **Visiting student supervision** Matheus Pinheiro (Brazil) January - May 2020
Dielectric spectroscopy of aqueous solutions
- **Visiting student supervision** Emma Carlsen (USA) September - November 2019
Dielectric properties of alcohools
- **Visiting student supervision** Jayani Try (UK) September - November 2019
Data-driven approach to energy systems dynamics prediction
- **Visiting student supervision** Pieter-Jan Stas (USA) June - August 2019
Machine learning approach to complex many-body physics

◇ TEACHING AND STUDENT SUPERVISION (continued)

- ★ Ecole Nationale Supérieure d'Ingénieurs de Caen (ENSICAEN) Caen, France
– **Project supervision** of Antoine Charmion, Bastien Lachaud and Mohamed Merini (5th-year students) October 2013 - January 2014
Coupling of a thermogenerator to a mesoscale combustion chamber
– **Tutor** - *Finite-time thermodynamics for 5th-year students: 24 contact hours* October 2012 - November 2013
- ★ CNRT Matériaux and CRISMAT laboratories, CNRS Caen, France
– **PhD co-supervision** of Yann Apertet April 2011 - September 2013
Reflections on the thermodynamic optimization of thermoelectric generators
– **Project supervision** of Paul Robert (3rd-year student) April 2012 - June 2012
Thermoelectricity and its application to refrigeration
- ★ Université de Caen - Institut Universitaire de Technologie Caen, France
– **Tutor** - *Classical mechanics - 1st-year students: 48 contact hours* February 2012 - June 2012
- ★ LASMEA laboratory, CNRS Clermont-Ferrand, France
– **Project supervision** of Renaud Varache (3rd-year student) May 2007 - July 2007
Exciton-electron scattering in semiconductor quantum-wells
- ★ Université de Caen - Faculty of Sciences and ENSICAEN Caen, France
– **Temporary lecturer** - *Full time: 192 contact hours/year* September 2004 - August 2006
Undergraduate physics tutorials and laboratory demonstrations from 1st- to 4th-year level; semiconductor physics tutorials, 4th- and 5th-year levels.
- ★ Heriot-Watt University - Physics Department Edinburgh, Scotland
– **Tutor** - *Tutorials - 1st-year physics students: 130 contact hours/year* October 1998 - November 2001

◇ PROJECT MANAGEMENT AS LEADER

- Skolkovo Institute of Science and Technology (Skoltech) Moscow, Russia
Skoltech start-up research funds - *Energy conversion physics* April 2018 - February 2022
Source: **Skolkovo Foundation** - amount: **14 millions rubles**
- Skolkovo Institute of Science and Technology (Skoltech) Moscow, Russia
Next Generation Skoltech-MIT - *Integration and control of heat and power systems with variable loads* July 2018 - December 2019
Source: **Skolkovo Foundation** - amount: **20 millions rubles**

◇ ADMINISTRATIVE WORK AND ACADEMIC DUTIES

- **Co-Chair** of Skoltech's Engineering Systems PhD Program Committee.
- **Member** of Skoltech's Educational Committee.
- **Member** of Skoltech's Energy Systems MSc and PhD programs selection and evaluation panels.
- **Ph. D. jury examiner**
 - Dr. Andrey Churkin's doctoral thesis, Skoltech, Russia (19 November 2020)
 - Dr. Timur Sayfutdinov's doctoral thesis, Skoltech, Russia (10 March 2020)
 - Dr. Mikhail Dobynde's doctoral thesis, Skoltech, Russia (17 February 2020)
 - Dr. Mazhar Ali's doctoral thesis, Skoltech, Russia (09 December 2019)
 - Dr. Yann Apertet's doctoral thesis, Université Paris-Saclay, France (13 December 2013).
- **Expert referee** for the French National Research Agency.
 - PROGELEC (Production Renouvelable et Gestion de l'Electricité / Sustainable Electricity Production and Management) programme of 2012, Paris, France (2012).
 - Referee for the Physics Committee (Comité Scientifique Disciplinaire CSD 4 Physique) to evaluate the progress of the funded projects of the 2009 programme "Theoretical Spectroscopy and Radiation-Matter Interactions", Paris, France (10 April 2012).

- ◇ **Guest Editor** for Entropy's special issue [Nonequilibrium Thermodynamics and Stochastic Processes](#).
- ◇ **Program Co-Chair** of the International Conference on Key Materials Engineering [ICKEM 2021](#).
- ◇ **Referee** for Nature Energy, Physical Review Letters, Physical Review A, B and E, Applied Physics Letters, Journal of Applied Physics, Entropy, Journal of Low Temperature Physics, Energy Conversion and Management, Physica A.

LANGUAGES

French/English bilingual **Spanish** fluent **Kabyle** proficient **Russian** lower intermediate

◇ MISCELLANEOUS

- **European project officer** (April 2016 - September 2016)
 - Intern at a French regional development agency [AD Normandie](#) as bid writing assistant for European projects applications. The project *FFWD Europe - business accelerator* (2017-2022) which we submitted in the frame of the 2nd call of Interreg Europe "SME competitiveness" was [approved](#) for funding - - amount awarded: **1.8 million euros**.
- **Secondary teaching** - mathematics (September 2010 - January 2011)
 - Collège P. S. de Laplace, Lisieux: 6ème, 5ème, and 3ème (114 contact hours).
 - Lycée Charles de Gaulle, Caen: 1ère S and 1ère ES (86 contact hours).
- **National service** "Protocole Ville" (November 1997 - August 1998) – 2nd class soldier at the Ecole de Défense Nucléaire, Bactériologique et Chimique (Carpiquet, France) appointed at the Youth Service of the Town of Lisieux Council to join their educative team and supervise groups of teenagers in underprivileged areas of the town. I also set up an after-school activity to help with homework.
- **Volunteer** as part of a team to assist a family with the therapy of their young autistic child during 18 months in Edinburgh from 1999 to 2001.
- **Volunteer** within various charities (Retraite Solidarité, Association Fondation Etudiante pour la Ville, and ATD Quart Monde) aiming at helping children and teenagers overcoming the difficulties they experience at school, from 1993 to 1998, and 2006-2007.

PERSONAL INFORMATION

Birth date and citizenship	Born on the 10th of May 1973, French
Family situation	Married, father of 3 children
Memberships	American Physical Society Quantum Transport and Thermodynamics Society
Professionnal networks	Research Gate , publons , LinkedIn

SCIENTIFIC OUTPUT (March 2022)

- ◇ 77 publications of which 71 original articles, comments and replies in international peer-reviewed physics journals, 1 monography, 1 invited book chapter, and 4 book chapters.
- ◇ Scopus: 1025 citations, $h = 18$; Web of Science: 931 citations, $h = 18$.
- ◇ 1717 citations on scholar; $h = 22$; $i10 = 44$.
- ◇ RG score: 36.43 (> 95% of ResearchGate members' scores).

◇ SELECTION OF RECENT PUBLICATIONS IN SCOPUS/WOS-INDEXED JOURNALS

- I. A. Luchnikov, D. Métivier, **H. Ouerdane**, and M. Chertkov.
 ★ *Super-relaxation of space-time-quantized ensemble of energy loads to curtail their synchronization after demand response perturbation.*
Applied Energy **285**, 116419 (2021) – doi:[10.1016/j.apenergy.2020.116419](https://doi.org/10.1016/j.apenergy.2020.116419)
- E. Herbert*, **H. Ouerdane***, V. Bels, Ph. Lecoeur, and C. Goupil.
 (* equal contribution)
 ★★*Thermodynamics of animal locomotion* .
Physical Review Letters **125**, 22 (2020) – doi:[10.1103/PhysRevLett.125.228102](https://doi.org/10.1103/PhysRevLett.125.228102)
- V. Artemov, E. Uykur, P. Kapralov, A. Kiselev, K. Stevenson, **H. Ouerdane**, and M. Dressel.
 ★*Anomalously high proton conduction of interfacial water.*
The Journal of Physical Chemistry Letters **11**, 3623 (2020) – doi: [10.1021/acs.jpcclett.0c00910](https://doi.org/10.1021/acs.jpcclett.0c00910)
- I. Luchnikov, S. Vintskevitch, **H. Ouerdane**, and S. Filippov.
 ★ *Simulation complexity of open quantum dynamics: connection with tensor networks.*
Physical Review Letters **122**, 160401 (2019) – doi:[10.1103/PhysRevLett.122.160401](https://doi.org/10.1103/PhysRevLett.122.160401)
- A. Ryzhov, **H. Ouerdane**, E. Gryazina, A. Bisch, and K. Turitsyn.
 ★ *Model predictive control of indoor microclimate: existing building stock comfort improvement.*
Energy Conversion and Management **179**, 219 (2019) – doi:[10.1016/j.enconman.2018.10.046](https://doi.org/10.1016/j.enconman.2018.10.046)

◇ BOOK CHAPTERS

1. A. Vargas Almeida, M. A. Olivares-Robles, and **H. Ouerdane**.
 ★★ *Performance analysis of composite thermoelectric generators.*
 Chapter 20, pp. 511-539 in **Thermoelectric Power Generation – Advanced Materials and Devices**,
 M. Nikitin and S. Skipidarov editors (2016). INTECH - ISBN 978-953-51-4929-3.
2. K. Zabrocki, C. Goupil, **H. Ouerdane**, E. Müller, and W. Seifert.
 ★★ *Segmented Devices and Networking of TE Elements.*
 Chapter 3, pp.157-176, in **Continuum theory and modeling of thermoelectric elements**
 C. Goupil, Editor (Wiley-VCH, 2016)
 Print ISBN: 9783527413379 – Online ISBN: 9783527338405 – doi: [10.1002/9783527338405.ch3](https://doi.org/10.1002/9783527338405.ch3)
3. K. Zabrocki, C. Goupil, **H. Ouerdane**, Y. Apertet, W. Seifert, and E. Müller .
 ★★ *Continuum Theory of TE Elements.*
 Chapter 2, pp.75-156, in **Continuum theory and modeling of thermoelectric elements**
 C. Goupil, Editor (Wiley-VCH, 2016)
 Print ISBN: 9783527413379 – Online ISBN: 9783527338405 – doi: [10.1002/9783527338405.ch2](https://doi.org/10.1002/9783527338405.ch2)
4. C. Goupil, **H. Ouerdane**, K. Zabrocki, W. Seifert, N. F. Hinsche, and E. Müller.
 ★★ *Thermodynamics and Thermoelectricity.*
 Chapter 1, pp.1-74, in **Continuum theory and modeling of thermoelectric elements**
 C. Goupil, Editor (Wiley-VCH, 2016)
 Print ISBN: 9783527413379 – Online ISBN: 9783527338405 – doi: [10.1002/9783527338405.ch1](https://doi.org/10.1002/9783527338405.ch1)
5. **H. Ouerdane**, Y. Apertet, C. Goupil, A. Michot, and A. About.
 ★★ *A linear nonequilibrium thermodynamics approach to optimization of thermoelectric devices.*
Invited chapter in **Thermoelectric Nanomaterials**, K. Koumoto and T. Mori editors
 Springer Series in Materials Science, vol. 182, pp. 323-351 (2013)
 ISBN 978-3-642-37536-1 – doi: [10.1007/978-3-642-37537-8_14](https://doi.org/10.1007/978-3-642-37537-8_14)

◇ MONOGRAPH

6. C. Goupil, **H. Ouerdane**, and Y. Apertet.
 ★★ *Thermoélectricité: thermodynamique et applications.*
Invited monograph in the collection: **Techniques de l'Ingénieur**, BE8080 (2013).

7. B. Mohseni-Gharyehsafa, Y. Lyulin, O. Kabov, and **H. Ouerdane**.
 ★ *Characterization and performance of a 3D-printed two-phase thermosyphon*
Thermal Science and Engineering Progress **28**, 101001 (2022) – doi: [10.1016/j.tsep.2021.101001](https://doi.org/10.1016/j.tsep.2021.101001)
8. S. A. Evlashin, J. V. Bondareva, T. F. Aslyamov, Y. V. Lyulin, K. I. Maslakov, K. V. Mironovich, M. A. Tarkhov, and **H. Ouerdane**.
 ★★ *Plasma modification of carbon nanowalls induces transition from superhydrophobic to superhydrophilic*
Nanotechnology **32**, 435706 (2021) – doi: [10.1088/1361-6528/ac153f](https://doi.org/10.1088/1361-6528/ac153f)
9. B. Mohseni-Gharyehsafa, J. Abolfazli Esfahani, K. C. Kim, and **H. Ouerdane**.
 ★ *Soft computing approach analysis of thermohydraulic enhancement using twisted tapes in a flat-plate solar collector: Sensitivity analysis and multi-objective optimization*
Journal of Cleaner Production **314**, 127947 (2021) – doi: [10.1016/j.jclepro.2021.127947](https://doi.org/10.1016/j.jclepro.2021.127947)
10. A. Kotliar-Shapiro, F. Fedorov, **H. Ouerdane**, S. Evlashin, A. Nasibulin, and K. Stevenson.
 ★ *Chemical space mapping for multicomponent gas mixtures*
Journal of Electroanalytical Chemistry **895**, 115472 (2021) – doi: [10.1016/j.jelechem.2021.115472](https://doi.org/10.1016/j.jelechem.2021.115472)
11. A. Sleptsov, A. Ryzhov, I. Luchnikov, A. Haji Hosseinloo, **H. Ouerdane**, and A. Bischi.
 ★ *Discrete-mode controllers of HVAC system's field devices: performance gap, coordination, and integration into future energy networks*
Energy Reports **7**(3), 216 (2021) – doi: [10.1016/j.egy.2021.06.037](https://doi.org/10.1016/j.egy.2021.06.037)
12. I. A. Luchnikov, A. Ryzhov, S. N. Filippov, and **H. Ouerdane**.
 ★ *QGOpt: Riemannian optimization for quantum technologies*
SciPost Physics **10**, 079 (2021)– doi: [10.21468/SciPostPhys.10.3.079](https://doi.org/10.21468/SciPostPhys.10.3.079)
13. G. V. Kuznetsov, K. O. Ponomarev, D. V. Feoktistov, E. G. Orlova, Y. V. Lyulin, and **H. Ouerdane**.
 ★ *Heat transfer in a two-phase closed thermosyphon working in polar regions.*
Thermal Science and Engineering Progress **22**, 100846 (2021) – doi: [10.1016/j.tsep.2021.100846](https://doi.org/10.1016/j.tsep.2021.100846)
14. V. Shevchenko, A. Mialdun, V. Yasnou, Y. V. Lyulin, **H. Ouerdane**, and V. Shevtsova.
 ★ *Investigation of diffusive and optical properties of vapour-air mixtures: The benefits of interferometry.*
Chemical Engineering Science **233**, 116433 (2021) – doi:[10.1016/j.ces.2020.116433](https://doi.org/10.1016/j.ces.2020.116433)
15. I. A. Luchnikov, D. Métivier, **H. Ouerdane**, and M. Chertkov.
 ★ *Super-relaxation of space-time-quantized ensemble of energy loads to curtail their synchronization after demand response perturbation.*
Applied Energy **285**, 116419 (2021) – doi:[10.1016/j.apenergy.2020.116419](https://doi.org/10.1016/j.apenergy.2020.116419)
16. V. G. Artemov, A. Ryzhov, E. Carlsen, P. O. Kapralov, and **H. Ouerdane**
 ★ *Non-rotational mechanism of polarization in alcohols*
The Journal of Physical Chemistry B **124**, 11022 (2020) – doi: [10.1021/acs.jpcc.0c09380](https://doi.org/10.1021/acs.jpcc.0c09380)
17. E. Herbert*, **H. Ouerdane***, V. Bels, Ph. Lecoeur, and C. Goupil.
 (* equal contribution)
 ★★*Thermodynamics of animal locomotion*
Physical Review Letters **125**, 22 (2020) – doi:[10.1103/PhysRevLett.125.228102](https://doi.org/10.1103/PhysRevLett.125.228102)
18. G. V. Kuznetsov, K. O. Ponomarev, D. V. Feoktistov, E. G. Orlova, **H. Ouerdane**, and Y. Lyulin.
 ★*New approach to the heat transfer modeling in the coolant layer on the lower cover of a thermosyphon.*
International Journal of Heat and Mass Transfer **163**, 120555 (2020) –
 doi:[10.1016/j.ijheatmasstransfer.2020.120555](https://doi.org/10.1016/j.ijheatmasstransfer.2020.120555)
19. A. H. Hosseinloo, A. Ryzhov, A. Bischi, **H. Ouerdane**, K. Turitsyn, M. A. Dahleh.
 ★ *Data-driven control of micro-climate in buildings: an event-triggered reinforcement learning approach.*
Applied Energy **277**, 115451 (2020) – doi:[10.1016/j.apenergy.2020.115451](https://doi.org/10.1016/j.apenergy.2020.115451)
20. V. G. Artemov, E. Uykur, S. Roh, A. Pronin, **H. Ouerdane**, and M. Dressel.
 ★*Revealing excess protons in the infrared spectrum of liquid water.*
Scientific Reports **10**, 11320 (2020) – doi:[10.1038/s41598-020-68116-w](https://doi.org/10.1038/s41598-020-68116-w)
21. V. Artemov, E. Uykur, P. Kapralov, A. Kiselev, K. Stevenson, **H. Ouerdane**, and M. Dressel.
 ★*Anomalously high proton conduction of interfacial water.*
The Journal of Physical Chemistry Letters **11**, 3623 (2020) – doi: [10.1021/acs.jpcclett.0c00910](https://doi.org/10.1021/acs.jpcclett.0c00910)

◇ RESEARCH ARTICLES (continued)

22. Y. Lyulin, A. Kreta, **H. Ouerdane**, and O. A. Kabov.
★ *Experimental study of convective motions by the PIV technique within an evaporating liquid layer into a gas flow.*
Microgravity Science and Technology **32**, 203 (2020) – doi:[10.1007/s12217-019-09759-x](https://doi.org/10.1007/s12217-019-09759-x)
23. I. Luchnikov, A. Ryzhov, P.-J. Stas, S. Filippov, and **H. Ouerdane**.
★★ *Variational autoencoder reconstruction of complex many-body physics.*
Entropy **21**, 1091 (2019) – doi:[10.3390/e21111091](https://doi.org/10.3390/e21111091)
24. I. Luchnikov, S. Vintskevitch, **H. Ouerdane**, and S. Filippov.
★ *Simulation complexity of open quantum dynamics: connection with tensor networks.*
Physical Review Letters **122**, 160401 (2019) – doi:[10.1103/PhysRevLett.122.160401](https://doi.org/10.1103/PhysRevLett.122.160401)
25. D. Smirnov, M. Kukolev, A. Saichenko, V. Dvortsov, M. Tkachenko, A. Bischì, and **H. Ouerdane**.
★ *Experimental study of a high-tolerance piston-cylinder pair in the alpha Ross-yoke Stirling refrigerator.*
International Journal of Refrigeration **100**, 235 (2019) – doi:[10.1016/j.ijrefrig.2019.01.018](https://doi.org/10.1016/j.ijrefrig.2019.01.018)
26. C. Goupil, **H. Ouerdane**, E. Herbert, and Y. D'Angelo.
★*Thermodynamics of metabolic energy conversion under muscle load.*
New Journal of Physics **21**, 023021 (2019) – doi:[10.1088/1367-2630/ab0223](https://doi.org/10.1088/1367-2630/ab0223)
27. A. Ryzhov, **H. Ouerdane**, E. Gryazina, A. Bischì, and K. Turitsyn.
★ *Model predictive control of indoor microclimate: existing building stock comfort improvement.*
Energy Conversion and Management **179**, 219 (2019) – doi:[10.1016/j.enconman.2018.10.046](https://doi.org/10.1016/j.enconman.2018.10.046)
28. Y. Apertet, **H. Ouerdane**, C. Goupil, and Ph. Lecoeur.
★★ *True nature of the Curzon-Ahlborn efficiency.*
Physical Review E **96**, 022119 (2017) - doi: [10.1103/PhysRevE.96.022119](https://doi.org/10.1103/PhysRevE.96.022119)
29. Y. Apertet and **H. Ouerdane**.
★ *Small-signal model for frequency analysis of thermoelectric systems.*
Energy Conversion and Management **149**, 564 (2017) - doi: [10.1016/j.enconman.2017.07.061](https://doi.org/10.1016/j.enconman.2017.07.061)
30. C. Goupil, **H. Ouerdane**, E. Herbert, G. Benenti, Y. D'angelo, and Ph. Lecoeur.
★★ *Closed-loop approach to thermodynamics.*
Physical Review E **94**, 032136 (2016) – doi:[10.1103/PhysRevE.94.032136](https://doi.org/10.1103/PhysRevE.94.032136)
31. G. Benenti, **H. Ouerdane**, and C. Goupil.
★★ *The thermoelectric working fluid: thermodynamics and transport* (Invited contribution).
Comptes Rendus Physique **17**, 1072 (2016) – doi:[10.1016/j.crhy.2016.08.004](https://doi.org/10.1016/j.crhy.2016.08.004)
32. A. Abbout, **H. Ouerdane**, and C. Goupil.
★★ *Statistical analysis of the figure of merit of a two-level thermoelectric system: a random matrix approach.*
Journal of the Physical Society of Japan **85**, 094704 (2016) – doi:[10.7566/JSPJ.85.094704](https://doi.org/10.7566/JSPJ.85.094704)
33. Y. Apertet, **H. Ouerdane**, C. Goupil, and Ph. Lecoeur.
★★ *A note on the electrochemical nature of the thermoelectric power.*
The European Physical Journal – Plus **131**, 76 (2016) – doi:[10.1140/epjp/i2016-16076-8](https://doi.org/10.1140/epjp/i2016-16076-8)
34. **H. Ouerdane**, Y. Apertet, C. Goupil, and Ph. Lecoeur.
★★ *Continuity and boundary conditions in thermodynamics: From Carnot's efficiency to efficiencies at maximum power* (Invited contribution).
European Physical Journal – Special Topics **224**, 839 (2015) – doi:[10.1140/epjst/e2015-02431-x](https://doi.org/10.1140/epjst/e2015-02431-x)
35. J. M. R Parrondo and **H. Ouerdane**.
★★ *Debate. Continuity and boundary conditions in thermodynamics: From Carnot's efficiency to efficiencies at maximum power.*
European Physical Journal – Special Topics **224**, 862 (2015) – doi:[10.1140/epjst/e2015-02431-x](https://doi.org/10.1140/epjst/e2015-02431-x)
36. **H. Ouerdane**, J. M. R. Parrondo, L. Granger, and L. S. Schulman.
★ *Debate. Maxwell demons in phase space.*
European Physical Journal – Special Topics **224**, 876 (2015) – doi:[10.1140/epjst/e2015-02432-9](https://doi.org/10.1140/epjst/e2015-02432-9)
37. **H. Ouerdane** and H. Qian.
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- Article in *Europhysics Letters* (2012) selected as [EPL Highlights of 2012](#).
- *Slave bosons in the radial gauge: a bridge between path integral and Hamiltonian language*, selected as one of the 25 *hottest articles* in the *Nuclear Physics B* – Oct.-Dec. 2007.

TECHNICAL REPORTS AND PRESENTATIONS FOR INDUSTRIAL PROJECTS

◇ ENERGY PATHWAYS FOR HEAT RECOVERY IN INDUSTRIAL SYSTEMS – CERES-2

In close collaboration with [EDF](#) (French home and business energy supplier).

1. **H. Ouerdane** and C. Goupil. Report on *Model of a thermoelectric generator dissipatively coupled to heat baths* (2013).
2. **H. Ouerdane** and C. Goupil. Oral presentation on *Intégration du module de simulation de thermogénérateurs à la plateforme logicielle CERES*. Workshop, EDF, la Défense, France, 12 October 2012.
3. **H. Ouerdane** and C. Goupil. Oral presentation on *Modélisation de générateurs thermoélectriques avec couplages dissipatifs aux sources thermiques, et programmation en langage MODELICA*. Consortium meeting, EDF-R&D, site des Renardières, Moret sur Loing, France, 20 January 2012.

◇ THERMOELECTRICITY-BASED HEAT-PUMPING SYSTEMS – SYSPACTE

In close collaboration with [ACOME](#) (a corporation specialized in electric systems).

4. A. Michot, H. Ouerdane, and C. Goupil. Report on *Modélisation du couplage d'un module Peltier aux sources thermiques via des échangeurs, en configurations air-air et eau-eau*, September 2012.
5. A. Michot, **H. Ouerdane**, and C. Goupil. Oral presentation on *Couplage d'un module Peltier aux sources thermiques via des échangeurs: modélisation et implémentation sous EES avec architecture de programmation modulaire*. Consortium meeting, Centre Scientifique et Technique du Bâtiment, Paris, 25 September 2012.
6. A. Michot, **H. Ouerdane**, and C. Goupil. *Caractérisation des matériaux thermoélectriques et étude pilote d'une simulation avec EES*. Consortium meeting, Centre Scientifique et Technique du Bâtiment, Champs-sur-Marne, France, 27 April 2012.

1. V. Artemov and **H. Ouerdane**.
Influence of ionic species on water broadband electrodynamic.
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2. V. Artemov, E. Uykur, P. Kapralov, A. Kiselev, K. Stevenson, **H. Ouerdane**, and M. Dressel.
Dynamical structure of water by dielectric and infrared spectroscopies: the role of ultrafast sub-picosecond proton exchange.
Poster presentation at the DESY Water week, Hamburg, Germany, 25-28 February 2020.
3. V. Artemov and **H. Ouerdane**.
Dynamical properties of ice and water: A broadband dielectric spectroscopy study.
Oral presentation at the 37th International Symposium on Dynamical Properties of Solids (DyProSo 2019), Ferrara, Italy, 8-12 September 2019.
4. C. Goupil, **H. Ouerdane**, E. Herbert.
Thermoelectric systems under various boundary conditions.
Oral presentation at the Conference on Modern Concepts and New Materials for Thermoelectricity, International Center for Theoretical Physics, Trieste, Italy, 11-15 March 2019.
5. **H. Ouerdane** and P. Vorobey.
Integration and control of heat and power systems with variable loads.
Oral presentation at the 3rd Annual Skoltech-MIT conference: Collaborative Solutions for Next Generation Education, Science and Technology, Skoltech, Moscow, 16 October 2018.
6. A. Ryzhov and **H. Ouerdane**.
Smart microclimate control systems.
Oral presentation at the Skoltech 2018 Innovation Workshop, Technopark, Innovation Center, Moscow, 11 September 2018.
7. I. A. Luchnikov, S. V. Vintskevich, **H. Ouerdane**, and S. N. Filippov.
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8. M. Glagolev and **H. Ouerdane**.
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12. C. Goupil, **H. Ouerdane**, Y. Apertet, and Ph. Lecoeur.
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13. C. Goupil, **H. Ouerdane**, and Y. Apertet.
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14. J. G. Stockholm, C. Goupil, P. Maussion, and **H. Ouerdane**.
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15. J. G. Stockholm, C. Goupil, P. Maussion, and **H. Ouerdane**.
Transient thermoelectricity: an active load story.
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16. Y. Apertet, **H. Ouerdane**, C. Goupil, and Ph. Lecoeur.
Optimization of thermoelectric generator operation with dissipative coupling to heat baths.
Oral Presentation at the 32nd International Conference on Thermoelectrics – ICT 2013, Kobe, Japan, 30 June to 4 July 2013.
17. H. Rotella, M. Morales, P. Roussel, **H. Ouerdane**, D. Chateigner, P. Boullay, L. Lutterotti, and W. Prellier.
Structure refinement of strained LaVO_3 thin film.
Oral presentation at the 13th European Powder Diffraction Conference, Grenoble, France, 28 to 31 October 2012.
18. Y. Apertet, **H. Ouerdane**, C. Goupil, and Ph. Lecoeur.
Internal convection in thermoelectric generator models.
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Oral presentation at the Phonons and fluctuations 3rd workshop, San Feliu De Guixols, Gérone, Spain, 21 to 24 May 2012.
20. **H. Ouerdane**.
Linear non-equilibrium thermodynamics: Overview and application to thermoelectricity.
Invited lecture at Journée de la Société Française de Thermique “Approche thermodynamique de la thermoélectricité: Thermodynamique à temps fini et optimisation exergétique”, Paris, 9 March 2012.
21. **H. Ouerdane** and Christophe Goupil.
Thermoelectricity - conversion of heat into electrical work.
Invited poster presentation at the Fourth Seminar of the European Centre and Laboratories for Energy Efficiency Research, EDF R&D, Ecole Polytechnique Fédérale de Lausanne, Lausanne, 8 and 9 September 2011.
22. L. Pilozzi, M. Glazov, **H. Ouerdane**, A. V. Kavokin, G. Malpuech, and A. d’Andrea.
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Invited oral presentation at the International School on Complex Phenomena in Nonlinear Physics, Erice, Italy, 3-7 October 2009.
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Polariton-polariton scattering in microcavities: A microscopic theory.
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25. G. Malpuech, D. D. Solnyshkov, **H. Ouerdane**, M. Glazov and I. Shelykh.
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Bose glass and superfluid phases of cavity polaritons.
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27. R. Frésard, **H. Ouerdane** and T. Kopp.
Slave bosons in the radial gauge: a bridge between the path integral and the Hamiltonian language.
Poster presentation at Orbital 2007, 6th Workshop on Orbital Physics and Novel Phenomena in Transition Metal Oxides, Stuttgart, Germany, October 2007.
28. **H. Ouerdane**.
Polariton-carrier scattering in quantum-wells.
Oral presentation at the 2nd International School on Nanophotonics, Maratea, Italy, September 2007.
29. **H. Ouerdane** and R. Varache.
Carrier assisted exciton radiative recombination in semiconductor quantum wells.
Poster at the International School of Nanophotonics, Maratea, Italy, September 2007.
30. D. D. Solnyshkov, G. Malpuech, **H. Ouerdane**, M. Glazov, I. Shelykh.
Bose glass and superfluid phases of cavity polaritons.
Talk at the 10th Conference on the Optics of Excitons in Confined Systems, Messina-Patti, Italy, September 2007.
31. G. Malpuech, D. D. Solnyshkov, **H. Ouerdane**, M. Glazov and I. Shelykh.
Influence of disorder on polariton Bose condensation.
Talk at the International Conference on Spontaneous Coherence in Excitonic Systems, Centre de Physique des Houches, France, January 2007.
32. R. Frésard, **H. Ouerdane** and T. Kopp.
Slave bosons in the radial gauge: a bridge between the path integral and the Hamiltonian language
Oral presentation at the XXX International Conference of Theoretical Physics: Electron correlations in nano- and macrosystems, Ustroń, Pologne, September 2006.
33. S. Fahy, A. Lindsay, **H. Ouerdane** and E. P. O'Reilly.
Quasi-localized states, electron scattering and carrier mobility in GaN_xAs_{1-x}.
Invited oral presentation at the American Physical Society March Meetings, March 2005.
34. **H. Ouerdane**, M. J. Jamieson, D. Vrinceanu and M. J. Cavagnero.
The variable phase method used to calculate and correct scattering lengths.
Poster presentation at the International Conference on Photonic Electronic and Atomic Collisions, Stockholm, Sweden, July 2003.
35. **H. Ouerdane**, M. J. Jamieson, D. Vrinceanu and M. J. Cavagnero.
The variable phase method used to calculate and correct scattering lengths.
Poster presentation at the Conference of the European Group for Atomic Spectroscopy, Brussels, Belgium, July 2003.
36. **H. Ouerdane**, G. Papageorgiou, I. Galbraith, A. K. Kar and B. S. Wherrett.
Ultrafast pump-probe dynamics in ZnSe-based semiconductor quantum-wells.
Poster presentation at the Conference on Quantum Electronics and Photonics 15, Glasgow, UK, September 2001.
37. **H. Ouerdane**.
Contribution of exciton-electron scattering to photoluminescence in quantum-wells.
Invited oral presentation at the Rank Prize Fund Conference (Optoelectronics), October 1999.

1. **H. Ouerdane**
Influence of dissipative coupling on thermal machines performance, Energy Colloquium, Skolkovo Institute of Science and Technology, Skolkovo, Russia, December 2018.
2. **H. Ouerdane**
The boundary conditions problem in thermodynamics: the illustrative case of thermoelectric generators, Skolkovo Institute of Science and Technology, Skolkovo, Russia, September 2017.
3. **H. Ouerdane**
Thermodynamic fluxes and forces in thermoelectricity, Energy Systems Scientific Seminars, Center for Energy Systems, Skolkovo Institute of Science and Technology, Skolkovo, Russia, March 2017.
4. **H. Ouerdane**
Thermoelectricity: a touchstone of thermodynamics of irreversible processes, Ecole Centrale de Casablanca, Casablanca, Morocco, December 2016.
5. **H. Ouerdane**
Thermoelectricity with charged exciton-polaritons, Mediterranean Institute of Physics, Marino, Rome, Italy, October 2013.
6. **H. Ouerdane**
Problèmes de diffusion par un potentiel traités par la méthode de la phase variable, Laboratoire de Physique Théorique et Modélisation, Cergy-Pontoise, France, April 2010.
7. **H. Ouerdane**
La méthode de la phase variable, Laboratoire de Cristallographie et Sciences des Matériaux, Caen, France, April 2009.
8. **H. Ouerdane**
Problèmes de collisions atomiques froides traités par la méthode de la phase variable, Laboratoire de Physique Moléculaire et des collisions, Université Paul Verlaine, Metz, France, March 2009.
9. **H. Ouerdane**
Evaluation du temps de spin-flip électronique par modélisation d'expériences pompe-sonde femtoseconde, Institut de Physique de Rennes, Université de Rennes 1, France, March 2008.
10. **H. Ouerdane**
Diffusion électron-exciton dans les puits quantiques à semiconducteurs, Laboratoire des Sciences des Matériaux pour l'Electronique et d'Automatique, Clermont-Ferrand, France, February 2007.
11. **H. Ouerdane**
Problèmes de diffusion traités par la méthode de la phase variable, Laboratoire Matériaux et Phénomènes Quantiques, Université Paris 7 Diderot, France, November 2007.
12. **H. Ouerdane**
Mobilité électronique dans les nitrures dilués, Laboratoire de Recherche sur les Propriétés des Matériaux Nouveaux, IUT d'Alençon, France, April 2006.
13. **H. Ouerdane**
Spectroscopie des solides: expériences pompe-sonde dans des puits quantiques ZnSe/ZnCdSe, Laboratoire de Physico-Chimie de l'Atmosphère, Université de Dunkerque, France, April 2006.
14. **H. Ouerdane**
Application de la méthode de la phase variable aux calculs de collisions atomiques ultra-froides, Groupe Simulation des Interactions entre Molécules, Photons et Atomes, Laboratoire Physique des Atomes, Lasers, Molécules, Surfaces, Université de Rennes 1, France, March 2006.
15. **H. Ouerdane**
Problèmes de diffusion traités par la méthode de la phase variable, Laboratoire des Sciences des Matériaux pour l'Electronique et d'Automatique, Clermont-Ferrand, France, December 2005.
16. **H. Ouerdane**
Expériences pompe-sonde en régime femtoseconde dans des puits quantiques ZnSe/ZnCdSe, une comparaison théorie/expérience, Groupe d'Optique Non-Linéaire et d'Opto-électronique, Institut de Physique et de Chimie de Strasbourg, France, January 2005.

17. **H. Ouerdane**
Approche de la méthode de la phase variable pour l'étude des collisions à basses températures, Laboratoire des Sciences des Matériaux pour l'Electronique et d'Automatique, Clermont-Ferrand, France, June 2004.
18. **H. Ouerdane**
Calculs de paramètres de diffusion d'atomes alcalins ultra-froids dérivés de la méthode de la phase variable, Laboratoire des Collisions Atomiques et Moléculaires, Orsay, France, February 2004.
19. **H. Ouerdane**
Ultrafast carrier dynamics in II-VI quantum-wells, Tyndall National Institute, Cork, Irlande, January 2004.
20. **H. Ouerdane**
Optical properties of the non-equilibrium 2D electron-hole plasma, Plasma Research Laboratory, Dublin City University, Dublin, Ireland, December 2003.
21. **H. Ouerdane**
Application of the variable phase method to the study of collisions of ultra-cold alkali atoms, Chemistry Department, Imperial College, London, UK, October 2003.
22. **H. Ouerdane**
Modeling of ultra-fast pump and probe experiments in semiconductor quantum-wells, Chemistry Department, Imperial College, London, UK, October 2003.
23. **H. Ouerdane**
Modélisation d'expériences pompe-sonde femtoseconde, Centre Interdisciplinaire de Recherche Ions Lasers, Caen, France, May 2003.
24. **H. Ouerdane**
Calculation of absorption spectra to model ultra-fast pump and probe experiments in semiconductor quantum-wells, Physics Department, Heriot-Watt University, Edinburgh, UK, December 2000.
25. **H. Ouerdane**
Contribution of exciton-electron scattering to photoluminescence in quantum-wells, Physics Department, Heriot-Watt University, Edinburgh, UK, December 1999.