

# HENNI OUERDANE, PH. D.

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## POST-GRADUATE EDUCATION AND QUALIFICATIONS

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- 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

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### ◇ RESEARCH WORKS

- Skolkovo Institute of Science and Technology (Skoltech) Moscow, Russian Federation  
**Associate Professor** - *Energy conversion physics and technology* June 2022 – present  
**Assistant Professor** - *Energy conversion physics and technology* April 2018 – May 2022  
**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

- **Supervision** of Dr. Valentin Leplat – Skoltech December 2023 - June 2024  
*Optimization methods development for flywheel energy storage*
- **Supervision** of Dr. Vasily Artemov – Skoltech October 2018 - April 2021  
*Dielectric spectroscopy of water and aqueous solutions for energy applications*
- **Supervision** of Dr. Yuriy Lyulin – Skoltech September 2018 - September 2020  
*Integration and control of heat and power systems with variable loads*
- **Supervision** of Dr. Alexander Ryzhov – Skoltech July 2017 - December 2019  
*Integration and control of heat and power systems with variable loads*
  
- **Co-supervision** of Dr. Adel Abbout – CRISMAT lab, CNRS 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** (MSc and PhD levels) October. 2018 - present  
*Fundamentals of energy conversion and technology* - course code MA060537  
*Nonequilibrium processes in energy conversion* - course code DA06200
  
- **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** Ilia Khomchenko – PhD **defended** November 2020 - Oct. 2024  
*Energy and information management in superconducting nanodevices*
- **PhD supervision** Javier Penuela November 2021 - present  
*Electrical power optimization for vertical agriculture*
- **PhD supervision** Sahar Moghimian Hoosh November 2022 - present  
*Non-intrusive load monitoring algorithm in smart greenhouses*
- **PhD supervision** Ilia Kamyshev September 2023 - present  
*Development of AI-based methods for energy disaggregation*
  
- **Master supervision** Anna Shkromada – **defended** - grade A September 2022 - June 2024  
*A bio-inspired nonlinear model predictive control-based center of mass motion planner for a quadrupedal robot: energy efficiency optimization*
- **Master supervision** Dmitry Bugrov – **defended** - grade A September 2022 - June 2024  
*Development and testing of a cooling system based on contour heat pipes for CubeSats*
- **Master supervision** Dmitry Bugrov – **defended** - grade A September 2022 - June 2024  
*Measurement methodology and hardware for crop lighting optimization Inside Plant Growth Chamber for Space-purposed Advanced Life Support Systems*
- **Master supervision** Svetlana Melnik – **defended** - grade A January 2021 - June 2022  
*Charge separation and accumulation in a pure-water-based supercapacitors*
- **Master supervision** Collins Ogbodo – **defended** - grade A January 2021 - June 2022  
*Development of digital twin of a phytotron for decision support and monitoring of indoor agriculture*
- **Master supervision** Olalekan Omoyele – **defended** - grade A January 2021 - June 2022  
*Optimization of district heating systems considering the pipe network and thermal inertia of buildings*
- **Master supervision** Javier Penuela – **defended** - grade A January 2020 - June 2021  
*Indoor agriculture electricity needs: a demand response analysis*
- **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** Roman Doronin – **defended** - grade B January 2019 - June 2020  
*Study of the charge storage capacity of the water-air interface*
- **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** Ilia Khomchenko – **defended** - grade A January 2019 - June 2020  
*New path for thermoelectric conversion technology: a thermodynamics approach*
- **Master supervision** Airat Kotlyar-Shapiro – **defended** - grade B October 2018 - June 2019  
*Ultramicroelectrode array-based gas sensors for air quality assessment and microclimate control*

◇ 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 (5<sup>th</sup>-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 (3<sup>rd</sup>-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 (3<sup>rd</sup>-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

- **Chair** of Skoltech's Engineering Systems PhD Program Committee (Co-Chair 2018-2022).
- **Chair** of Skoltech's Educational Committee (Member since 2018).
- **Member** of Skoltech's Engineering Systems MSc and PhD programs selection panels.
- **Ph. D. jury examiner (E) and Chair (C)**
  - **C** – Skoltech, Russia – Dr. Yana Brovar (24 October 2024); Dr. Sabah Farshad (12 February 2024); Dr. Galina Chikunova (13 December 2023); Dr. Mile Mitrovic (7 November 2023); Dr. Fernando Davalos (15 September 2023); Dr. Mikhail Nikolaev (16 December 2022); Dr. Rahim Samanbakhsh (21 November 2022).
  - **E** – Skoltech, Russia – Dr. Kirill Pavlenko (26 September 2022); Dr. Andrey Churkin (19 November 2020); Dr. Timur Sayfutdinov (10 March 2020); Dr. Mikhail Dobynde (17 February 2020); Dr. Mazhar Ali (09 December 2019).
  - **E** – Université Paris-Saclay, France – Dr. Yann Apertet (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

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

## ◇ MISCELLANEOUS

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- **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

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Birth date and citizenship	Born on the 10th of May 1973, French
Family situation	Married, father of 3 children
Memberships	<a href="#">American Physical Society</a> <a href="#">Quantum Transport and Thermodynamics Society</a>

## SCIENTIFIC OUTPUT (December 2024)

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- ◇ 88 publications of which 78 original articles, comments and replies in international peer-reviewed physics journals, 1 monograph, 1 invited book chapter, and 4 book chapters. 1 European patent.
- ◇ Scopus: 1399 citations,  $h = 22$ ; Web of Science: 1292 citations,  $h = 21$ .
- ◇ 2470 citations on scholar;  $h = 29$ ;  $i10 = 55$ .
- ◇ Research Interest score: 1268 (> 94% of [ResearchGate](#) members' scores).

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

- I. Khomchenko, P. Navez, and **H. Ouerdane**.  
 ★ *SQUID-based interferometric accelerometer*  
**Applied Physics Letters** **121**, 152601 (2022) – doi: [10.1063/5.0126680](https://doi.org/10.1063/5.0126680)
- 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)
- 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. Bischi, 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. L. Razzoli, G. Gemme, I. Khomchenko, M. Sassetti, **H. Ouerdane**, D. Ferraro, G. Benenti.  
 ★★ *Cyclic solid-state quantum battery: Thermodynamic characterization and quantum hardware simulation*  
**Quantum Science and Technology**, accepted for publication (2025) –  
 doi:[10.1088/2058-9565/ad9ed4](https://doi.org/10.1088/2058-9565/ad9ed4)
8. I. Khomchenko, A. Ryzhov, F. Kurth, R. Huehne, F. Maculewicz, M. Schleberger, C. Goupil, Ph. Lecoœur, A. Böhmer, G. Benenti, G. Schierning, and **H. Ouerdane**.  
 ★★ *The thermoelectric performance problem: Insights from the electron gas thermodynamics close to a phase transition.*  
**SciPost Physics Core**, accepted for publication (2024).
9. J. Penuela, C. Ben. S. Boldyrev, L. Gentzbittel, and **H. Ouerdane**.  
 ★ *The indoor agriculture industry: A promising player in demand response services.*  
**Applied Energy** 372, 123756 (2024) – doi: [10.1016/j.apenergy.2024.123756](https://doi.org/10.1016/j.apenergy.2024.123756)
10. I. Khomchenko, **H. Ouerdane**, and G. Benenti.  
 ★★ *Influence of the Anderson transition on thermoelectric energy conversion in disordered electronic systems.*  
**Journal of Physics: Conf. Series** 2701, 012018 (2024) - doi:[10.1088/1742-6596/2701/1/012018](https://doi.org/10.1088/1742-6596/2701/1/012018)
11. I. Kamyshev, S. Moghimian Hoosh, **H. Ouerdane**.  
 ★ *Physics-informed appliance signatures generator for energy disaggregation.*  
 7th IEEE Conference on Energy Internet and Energy Systems Integration, Hangzhou, China, 2023, pp. 3591-3596 - IEEE Xplore doi: [10.1109/EI259745.2023.10513031](https://doi.org/10.1109/EI259745.2023.10513031)
12. S. Moghimian Hoosh, **H. Ouerdane**, V. Terzijia, and D. Pozo.  
 ★ *Assessing the value of energy storage systems for distribution grid applications.*  
 7th IEEE Conference on Energy Internet and Energy Systems Integration, Hangzhou, China, 2023, pp. 813-818 - IEEE Xplore doi: [10.1109/EI259745.2023.10513229](https://doi.org/10.1109/EI259745.2023.10513229)
13. D. Smirnov, F. M. Ibanez, and **H. Ouerdane**.  
 ★★ *Junction temperature of CMOS electronics cooled by a regenerative cryocooler.*  
**Case Studies in Thermal Engineering** 52, 103688 (2023) - doi: [10.1016/j.csite.2023.103688](https://doi.org/10.1016/j.csite.2023.103688)
14. V. G. Artemov, A. Ryzhov, **H. Ouerdane**, and K. J. Stevenson.  
 ★ *Ionization difference between weak and strong electrolytes as perturbed by conductivity spectra analysis.*  
**Journal of Physical Chemistry B** 127, 261 (2023) - doi: [10.1021/acs.jpccb.2c06713](https://doi.org/10.1021/acs.jpccb.2c06713)
15. I. Khomchenko, **H. Ouerdane**, and G. Benenti.  
 ★ *Voltage-amplified heat rectification in SIS junctions.*  
**Physical Review B** 106, 245413 (2022) - doi: [10.1103/PhysRevB.106.245413](https://doi.org/10.1103/PhysRevB.106.245413)
16. I. Khomchenko, P. Navez, and **H. Ouerdane**.  
 ★ *SQUID-based interferometric accelerometer*  
**Applied Physics Letters** 121, 152601 (2022) – doi: [10.1063/5.0126680](https://doi.org/10.1063/5.0126680)
17. I. A. Luchnikov, E. O. Kiktenko, M. A. Gavreev, **H. Ouerdane**, S. N. Filippov, and A. K. Fedorov.  
 ★ *Probing non-Markovian quantum dynamics with data driven analysis: Beyond “black-box” machine learning models*  
**Physical Review Research** 4, 043002 (2022) – doi: [10.1103/PhysRevResearch.4.043002](https://doi.org/10.1103/PhysRevResearch.4.043002)
18. B. Mohseni-Gharyehsafa, Y. Lyulin, O. Kabov, and **H. Ouerdane**.  
 ★ *Characterization and performance of a 3D-printed two-phase thermosiphon*  
**Thermal Science and Engineering Progress** 28, 101001 (2022) – doi: [10.1016/j.tsep.2021.101001](https://doi.org/10.1016/j.tsep.2021.101001)
19. 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)

◇ RESEARCH ARTICLES (continued)

20. 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)
21. 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)
22. 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)
23. 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)
24. 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)
25. 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)
26. 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)
27. 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)
28. 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)
29. 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)
30. 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)
31. 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)
32. V. Artemov, E. Uykur, P. Kapralov, A. Kiselev, K. Stevenson, **H. Ouerdane**, and M. Dressel.  
★*Anomalous 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)
33. 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)
34. 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)
35. 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)

◇ RESEARCH ARTICLES (continued)

36. D. Smirnov, M. Kukolev, A. Saichenko, V. Dvortsov, M. Tkachenko, A. Bischi, 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)
37. 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)
38. A. Ryzhov, H. Ouerdane, E. Gryazina, A. Bischi, 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)
39. 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)
40. 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)
41. 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)
42. 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)
43. 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)
44. 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)
45. 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)
46. 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)
47. 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)
48. H. Ouerdane and H. Qian.  
★ *Debate. Thermodynamics of the general diffusion process: Equilibrium supercurrent and nonequilibrium driven circulation with dissipation.*  
**European Physical Journal – Special Topics** **224**, 797 (2015) – doi:[10.1140/epjst/e2015-02427-6](https://doi.org/10.1140/epjst/e2015-02427-6)
49. H. Ouerdane, A. A. Varlamov, A. V. Kavokin, C. Goupil, and C. B. Vining.  
★*Enhanced thermoelectric coupling near electronic phase transition: the role of fluctuation Cooper pairs.*  
**Physical Review B** **91**, 100501(R) (2015) - doi:[10.1103/PhysRevB.91.100501](https://doi.org/10.1103/PhysRevB.91.100501)
50. H. Rotella, O. Copie, G. Mouillard-Stéciuk, H. Ouerdane, P. Boullay, P. Roussel, M. Morales, A. David, A. Pautrat, B. Mercey, L. Lutterotti, D. Chateigner, and W. Prellier.  
★ *Structural analysis of strained LaVO<sub>3</sub> thin films.*  
**Journal of Physics: Condensed Matter** **27**, 175001 (2015) – doi:[10.1088/0953-8984/27/17/175001](https://doi.org/10.1088/0953-8984/27/17/175001)
51. Y. Apertet, H. Ouerdane, C. Goupil, and Ph. Lecoeur.  
★ *Equivalent parameters for series thermoelectrics.*  
**Energy Conversion and Management** **93**, 160 (2015) - doi: [10.1016/j.enconman.2014.12.077](https://doi.org/10.1016/j.enconman.2014.12.077)

◇ RESEARCH ARTICLES (continued)

52. J. G. Stockholm, C. Goupil, P. Maussion, and **H. Ouerdane**.  
★*Transient thermoelectricity: an active load story.*  
**Journal of Electronic Materials** **44**, 1768 (2015) - doi: [10.1007/s11664-014-3545-z](https://doi.org/10.1007/s11664-014-3545-z)
53. Y. Apertet, **H. Ouerdane**, C. Goupil, and Ph. Lecoeur.  
★*Influence of thermal environment on optimal working conditions of thermoelectric generators.*  
**Journal of Applied Physics** **116**, 144901 (2014) - doi: [10.1063/1.1.4897350](https://doi.org/10.1063/1.1.4897350)
54. Y. Apertet, **H. Ouerdane**, C. Goupil, and Ph. Lecoeur.  
★*Comment on "Effective thermal conductivity in thermoelectric materials".*  
**Journal of Applied Physics** **115**, 126101 (2014) - doi: [10.1063/1.4869138](https://doi.org/10.1063/1.4869138)
55. Y. Apertet, **H. Ouerdane**, C. Goupil, and Ph. Lecoeur.  
★*Revisiting Feynman's ratchet with thermoelectric transport theory.*  
**Physical Review E** **90**, 012113 (2014) - doi: [10.1103/PhysRevE.90.012113](https://doi.org/10.1103/PhysRevE.90.012113)
56. Y. Apertet, **H. Ouerdane**, A. Michot, C. Goupil, and Ph. Lecoeur.  
★*On the efficiency at maximum cooling power.*  
**Europhysics Letters** **103**, 40001 (2013) - doi: [10.1209/0295-5075/103/40001](https://doi.org/10.1209/0295-5075/103/40001)
57. Y. Apertet, **H. Ouerdane**, C. Goupil, and Ph. Lecoeur.  
★*From local force-flux relationships to internal dissipations and their impact on heat engine performance: The illustrative case of a thermoelectric generator.*  
**Physical Review E** **88**, 022137 (2013) - doi: [10.1103/PhysRevE.88.022137](https://doi.org/10.1103/PhysRevE.88.022137)
58. A. Abbout, **H. Ouerdane**, and C. Goupil.  
★*Mesoscopic thermoelectric transport near zero transmission energies.*  
**Physical Review B** **87**, 155410 (2013) - doi: [10.1103/PhysRevB.87.155410](https://doi.org/10.1103/PhysRevB.87.155410)
59. Y. Apertet, **H. Ouerdane**, O. Glavatskaya, C. Goupil, and Ph. Lecoeur.  
★*Reply to the Comment on "Optimal working conditions for thermoelectric generators with realistic thermal coupling".*  
**Europhysics Letters** **101**, 68008 (2013) - doi: [10.1209/0295-5075/101/68008](https://doi.org/10.1209/0295-5075/101/68008)
60. Y. Apertet, **H. Ouerdane**, C. Goupil, and Ph. Lecoeur.  
★*Internal convection in thermoelectric generator models.*  
**Journal of Physics: Conference Series** **395**, 012203 (2012) - doi: [10.1088/1742-6596/395/1/012103](https://doi.org/10.1088/1742-6596/395/1/012103)
61. Y. Apertet, **H. Ouerdane**, C. Goupil, and Ph. Lecoeur.  
★*Efficiency at maximum power of thermally coupled heat engines.*  
**Physical Review E** **85**, 041144 (2012) - doi: [10.1103/PhysRevE.85.041144](https://doi.org/10.1103/PhysRevE.85.041144)
62. Y. Apertet, **H. Ouerdane**, C. Goupil, and Ph. Lecoeur.  
★*Irreversibilities and efficiency at maximum power of heat engines: The illustrative case of a thermoelectric generator.*  
**Physical Review E** **85**, 031116 (2012) - doi: [10.1103/PhysRevE.85.031116](https://doi.org/10.1103/PhysRevE.85.031116)
63. Y. Apertet, **H. Ouerdane**, C. Goupil, and Ph. Lecoeur.  
★*Thermoelectric internal current loops inside inhomogeneous systems.*  
**Physical Review B** **85**, 033201 (2012) - doi: [10.1103/PhysRevB.85.033201](https://doi.org/10.1103/PhysRevB.85.033201)
64. Y. Apertet, **H. Ouerdane**, O. Glavatskaya, C. Goupil, and Ph. Lecoeur.  
★*Optimal working conditions for thermoelectric generators with realistic thermal coupling.*  
**Europhysics Letters** **97**, 28001 (2012) - doi: [10.1209/0295-5075/97/28001](https://doi.org/10.1209/0295-5075/97/28001)
65. **H. Ouerdane**.  
★*Analytic model of effective screened Coulomb interactions in a multilayer system.*  
**Journal of Applied Physics** **110**, 074905 (2011) - doi: [10.1063/1.3646482](https://doi.org/10.1063/1.3646482)
66. P. Bogdanski and **H. Ouerdane**.  
★*Coulomb singularities in scattering wave functions of spin-orbit-coupled states.*  
**Journal of Mathematical Physics** **52**, 073515 (2011) - doi: [10.1063/1.3610667](https://doi.org/10.1063/1.3610667)
67. M. J. Jamieson and **H. Ouerdane**.  
★*Parameters for cold collisions of lithium and caesium atoms.*  
**Chinese Physics Letters** **28**, 060308 (2011) - doi: [10.1088/0256-307X/28/6/060308](https://doi.org/10.1088/0256-307X/28/6/060308)
68. M. J. Jamieson and **H. Ouerdane**.  
★*Error cancellation in the semiclassical calculation of the scattering length.*  
**The European Physical Journal D** **61**, 373 (2011) - doi: [10.1140/epjd/e2010-10498-x](https://doi.org/10.1140/epjd/e2010-10498-x)

◇ RESEARCH ARTICLES (continued)

69. **H. Ouerdane**, B. Gervais, H. Zhou, M. Beuve, and J.-Ph. Renault.  
★ *Radiolysis of water confined in porous silica: A simulation study of the physico-chemical yields.*  
**Journal of Physical Chemistry C** **114**, 12667 (2010) - doi: [10.1021/jp103127j](https://doi.org/10.1021/jp103127j)
70. **H. Ouerdane** and M. J. Jamieson.  
★ *Comment on "Scattering length for fermionic alkali atoms".*  
**The European Physical Journal D** **57**, 325 (2010) - doi: [10.1140/epjd/e2010-00064-1](https://doi.org/10.1140/epjd/e2010-00064-1)
71. M. J. Jamieson, A. S.-C. Cheung, and **H. Ouerdane**.  
★ *Dependence of the scattering length for hydrogen atoms on effective mass.*  
**The European Physical Journal D** **56**, 181 (2010) - doi: [10.1140/epjd/e2009-00280-8](https://doi.org/10.1140/epjd/e2009-00280-8)
72. L. Pilozzi, M. Glazov, **H. Ouerdane**, A. V. Kavokin, G. Malpuech, and A. D'Andrea.  
★ *Spin-dependent polariton-polariton scattering in planar microcavities.*  
**Superlattices and Microstructures** **47**, 1 (2010) - doi: [10.1016/j.spmi.2009.07.028](https://doi.org/10.1016/j.spmi.2009.07.028)
73. M. Glazov, **H. Ouerdane**, L. Pilozzi, A. V. Kavokin, G. Malpuech, and A. D'Andrea.  
★ *Polariton-polariton scattering in microcavities: A microscopic theory.*  
**Physical Review B** **80**, 155306 (2009) - doi: [10.1103/PhysRevB.80.155306](https://doi.org/10.1103/PhysRevB.80.155306)
74. **H. Ouerdane** and M. J. Jamieson.  
★ *S-wave and p-wave scattering in a cold gas of Na and Rb atoms.*  
**The European Physical Journal D** **53**, 27 (2009) - doi: [10.1140/epjd/e2009-00042-8](https://doi.org/10.1140/epjd/e2009-00042-8)
75. **H. Ouerdane**, R. Varache, M. E. Portnoi, and I. Galbraith.  
★ *Photon emission induced by elastic exciton-carrier scattering in semiconductor quantum wells.*  
**The European Physical Journal B** **65**, 195 (2008) - doi: [10.1140/epjb/e2008-00355-x](https://doi.org/10.1140/epjb/e2008-00355-x)
76. R. Frésard, **H. Ouerdane**, and T. Kopp.  
★ *Barnes slave-boson approach to the two-site SIAM with non-local interaction.*  
**Europhysics Letters** **82**, 31001 (2008) - doi: [10.1209/0295-5075/82/31001](https://doi.org/10.1209/0295-5075/82/31001)
77. D. D. Solnyshkov, **H. Ouerdane**, and G. Malpuech.  
★ *Kinetic phase diagrams of GaN-based polariton lasers.*  
**Journal of Applied Physics** **103**, 016101 (2008) - doi: [10.1063/1.2822148](https://doi.org/10.1063/1.2822148)
78. D. D. Solnyshkov, **H. Ouerdane**, M. Glazov, I. Shelykh, and G. Malpuech.  
★ *Bose glass and superfluid phase transitions of exciton-polaritons in GaN microcavities.*  
**Solid State Communications** **144**, 390 (2007) - doi: [10.1016/j.ssc.2007.07.046](https://doi.org/10.1016/j.ssc.2007.07.046)
79. R. Frésard, **H. Ouerdane**, and T. Kopp.  
★ *Slave bosons in the radial gauge: a bridge between path integral and Hamiltonian language.*  
**Nuclear Physics B** **785**, 286 (2007) - doi: [10.1016/j.nuclphysb.2007.05.025](https://doi.org/10.1016/j.nuclphysb.2007.05.025)
80. M. J. Jamieson, A. S.-C. Cheung, **H. Ouerdane**, G.-H. Jeung, and N. Geum.  
★ *S-wave scattering lengths and effective ranges for collisions of ground state Be atoms.*  
**Journal of Physics B: Atomic, Molecular and Optical Physics** **40**, 3497 (2007) - doi: [10.1088/0953-4075/40/17/016](https://doi.org/10.1088/0953-4075/40/17/016)
81. G. Malpuech, D. D. Solnyshkov, **H. Ouerdane**, M. Glazov, and I. Shelykh.  
★ *Bose glass and superfluid phases of cavity polaritons.*  
**Physical Review Letters** **98**, 206402 (2007) - doi: [10.1103/PhysRevLett.98.206402](https://doi.org/10.1103/PhysRevLett.98.206402)
82. P. Bogdanski and **H. Ouerdane**.  
★ *Scattering states of coupled valence-band holes in point defect potential from variable phase theory.*  
**Physical Review B** **74**, 085210 (2006) - doi: [10.1103/PhysRevB.74.085210](https://doi.org/10.1103/PhysRevB.74.085210)
83. S. Fahy, A. Lindsay, **H. Ouerdane**, and E. P. O'Reilly.  
★ *Alloy scattering of n-type carriers in GaN<sub>x</sub>As<sub>1-x</sub>.*  
**Physical Review B** **74**, 035203 (2006) - doi: [10.1103/PhysRevB.74.035203](https://doi.org/10.1103/PhysRevB.74.035203)
84. **H. Ouerdane** and M. J. Jamieson.  
★ *A note on the calculation of the effective range.*  
**Journal of Physics B: Atomic, Molecular and Optical Physics** **37**, 3765 (2004) - doi: [10.1088/0953-4075/37/18/016](https://doi.org/10.1088/0953-4075/37/18/016)
85. **H. Ouerdane** and M. J. Jamieson.  
★ *Scattering parameters for cold Li-Rb and Na-Rb collisions derived from variable phase theory.*  
**Physical Review A** **70**, 022712 (2004) - doi: [10.1103/PhysRevA.70.022712](https://doi.org/10.1103/PhysRevA.70.022712)

86. **H. Ouerdane**, M. J. Jamieson, D. Vrinceanu, and M. J. Cavagnero.  
 ★★ *The variable phase method used to calculate and correct scattering lengths.*  
**Journal of Physics B: Atomic, Molecular and Optical Physics** **36**, 4055 (2003) -  
 doi: [10.1088/0953-4075/36/19/013](https://doi.org/10.1088/0953-4075/36/19/013)
87. M. J. Jamieson, H. Sarbazi-Azad, **H. Ouerdane**, G.-H. Jeung, Y. S. Lee, and W. C. Lee.  
 ★ *Elastic scattering of cold rubidium and caesium atoms.*  
**Journal of Physics B: Atomic, Molecular and Optical Physics** **36**, 1085 (2003) -  
 doi: [10.1088/0953-4075/36/6/301](https://doi.org/10.1088/0953-4075/36/6/301)
88. **H. Ouerdane**, G. Papageorgiou, I. Galbraith, A.K. Kar, and B.S. Wherrett.  
 ★ *Ultrafast pump-probe dynamics in ZnSe-based semiconductor quantum-wells.*  
**Journal of the Optical Society of America B** **19**, 222 (2002) - doi: [10.1364/JOSAB.19.002022](https://doi.org/10.1364/JOSAB.19.002022)

◇ MANUSCRIPTS IN PREPARATION OR SUBMITTED, AND PREPRINTS

- J. Penuela, S. Moghimian Hoosh, I. Kamyshev, A. Bischi, and **H. Ouerdane**  
*Indoor thermal comfort management: A Bayesian machine-learning approach to data denoising and dynamics prediction of HVAC systems* – in preparation.
- S. Moghimian Hoosh, I. Kamyshev, J. Penuela, F. Mahmood, T. Al Ansari, and **H. Ouerdane**  
*NILMBench: Novel Benchmark With 10,000 Tests for non-intrusive load monitoring models* – in preparation.
- Y. Lyulin, D. Bugrov, R. Khurmatova, **H. Ouerdane**, and I. Marchuk.  
*Effect of gravity orientation on film-wise condensation in flattened tube* – in preparation.
- I. Kamyshev, S. Moghimian Hoosh, **H. Ouerdane**.  
*Enhancing non-intrusive load monitoring with features extracted by independent component analysis* – submitted.
- P. Navez and **H. Ouerdane**.  
*Quantum determinism and completeness restored by indistinguishability and long-time particle detection* – arXiv:[2409.15390](https://arxiv.org/abs/2409.15390)
- I. Kamyshev, S. Moghimian Hoosh, **H. Ouerdane**.  
*HiFAKES: High-frequency synthetic appliance signatures generator for non-intrusive load monitoring* – arXiv:[2409.00062](https://arxiv.org/abs/2409.00062).
- V. Kovalev, A. Shkromada, **H. Ouerdane**, and P. Osinenko.  
*Combining model-predictive control and predictive reinforcement learning for stable quadrupedal robot locomotion* – arXiv:[2307.07752](https://arxiv.org/abs/2307.07752)
- P.-J. C. Stas, S. Ghimire, and **H. Ouerdane**.  
*Modeling flywheel energy storage system charge and discharge dynamics* – arXiv:[2005.14634](https://arxiv.org/abs/2005.14634)
- D. Smirnov and **H. Ouerdane**.  
*Accurate estimation of temperatures in a cryogenic space cooled by a Stirling cryocooler* – engRxiv:[k8esv](https://engrxiv.org/abs/k8esv)

## ◇ PATENT

- European Patent Office – patent n° 3791776:  
*Method for determining the metabolic parameters of a person*

## ◇ MEDIA COVER AND HIGHLIGHTS

- *SQUID-based interferometric accelerometer* – [Kudos](#) website.
- *Fast mitigation of power grids instability* – [EurkAlert!](#) website.
- *V skoltehe nashli novyj sposob povysheniya stabilnosti energosistem* – [Naked Science](#) website (in Russian).
- *Alcohols exhibit quantum effects* – [Phys.org](#) website.
- *Spirty proyavlyayut kvantovyye svoystva* – [Naked Science](#) website (in Russian).
- *Making smart thermostats more efficient* – [MIT News](#).
- *Minimal waste production is a fundamental law for animal locomotion* – [EurkAlert!](#) website.
- *Svobodnoe dvizhenie minimiziruet proizvodstvo produktov metabolizma u zhivotnyh* – [Scientific Russia](#) website (in Russian).
- *Liquid is more than just hydrogen-oxygen molecules* – [Phys.org](#) website.
- *Izmerena elektroprovodnost pripoverhnostnogo sloya vody* – [Naked Science](#) website (in Russian).
- *Scientists measured electrical conductivity of pure interfacial water* – [EurekAlert!](#) website.
- *Uchenyye izmerili elektroprovodnost pripoverkhnostnogo sloya vody* – [Russian Foundation for Basic Research](#) website (in Russian).
- *Back to basic with thermoelectric power* – [Europhysicsnews](#), vol. 47, n°3.
- 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

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### ◇ 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. I. Kamyshev, S. Moghimian Hoosh, **H. Ouerdane**.  
*Physics-informed appliance signatures generator for energy disaggregation*.  
Oral presentation at the 7th IEEE Conference on Energy Internet and Energy Systems Integration, Hangzhou, China, 15-18 December 2023. Prize: **Best Paper Award**.
2. S. Moghimian Hoosh, **H. Ouerdane**, V. Terzijia, and D. Pozo.  
*Assessing the value of energy storage systems for distribution grid applications*. Oral presentation at the 7th IEEE Conference on Energy Internet and Energy Systems Integration, Hangzhou, China, 15-18 December 2023.
3. I. Khomchenko, P. Navez, and **H. Ouerdane**.  
*SQUID-based interferometric accelerometer*.  
Oral presentation at the 16th European Conference on Applied Superconductivity, Bologna, Italy, 3-7 September 2023.
4. I. Khomchenko, **H. Ouerdane**, and G. Benenti,  
*Influence of the Anderson transition on thermoelectric energy conversion in disordered electronic systems*.  
Oral presentation at the 12th International Conference on Mathematical Modelling in Physical Sciences, Belgrade, Serbia 28-31 August 2023.
5. I. Khomchenko, **H. Ouerdane**, and G. Benenti.  
*Voltage-amplified heat rectification*.  
Oral presentation at the annual conference on Quantum Thermodynamics – QTD 2023, Vienna, Austria 17-21 July 2023.
6. V. Artemov and **H. Ouerdane**.  
*Influence of ionic species on water broadband electrostatics*.  
Oral presentation at the APS March Meeting, Denver, CO, USA, 2-6 March 2020.
7. 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.
8. 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.
9. 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.
10. **H. Ouerdane** and P. Vorobev.  
*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.
11. A. Ryzhov and **H. Ouerdane**.  
*Smart microclimate control systems*.  
Oral presentation at the Skoltech 2018 Innovation Workshop, Technopark, Innovation Center, Moscow, 11 September 2018.
12. I. A. Luchnikov, S. V. Vintskevich, **H. Ouerdane**, and S. N. Filippov.  
*Tensor network approach to environment truncation for open quantum systems*.  
Oral presentation at the 14th Biennial IQSA conference Quantum Structures 2018, Kazan, Russia, 16 to 20 July 2018.
13. M. Glagolev and **H. Ouerdane**.  
*Smart district heating as a part of integrated energy systems of the Arctic region*.  
Poster presentation at the Gen-Y, Skoltech Young Scientists Cross-Disciplinary Conference, Sotchi, Russian Federation, 27 September to 1 October 2017.

14. C. Goupil, **H. Ouerdane**, E. Herbert, G. Benenti, Y. D'Angelo, V. Bels, et Ph. Lecoeur.  
*Conditions aux limites et rétroaction dans les systèmes thermodynamiques.*  
Poster presentation at the XX Rencontre du non-linéaire, Paris, France, 21 March to 23 March 2017.
15. C. Goupil, **H. Ouerdane**, Y. Apertet, and Ph. Lecoeur.  
*Thermodynamics of thermoelectric energy conversion.*  
Oral presentation at the Autumn School Thermoelectrics, Duisburg, Germany, 5 to 8 October 2015.
16. C. Goupil, **H. Ouerdane**, and Y. Apertet.  
*Feynman ratchets and thermoelectric systems: harmonic response and feedback.*  
Oral presentation at the XVI International Forum on thermoelectricity, Paris, France, 19 to 22 May 2015.
17. J. G. Stockholm, C. Goupil, P. Maussion, and **H. Ouerdane**.  
*Non-stationary response of thermoelectric generators.*  
Oral presentation at the 12th European Conference on Thermoelectrics – ECT 2014, Madrid, Spain, 24 September to 26 September 2014.
18. J. G. Stockholm, C. Goupil, P. Maussion, and **H. Ouerdane**.  
*Transient thermoelectricity: an active load story.*  
Oral presentation at the 33rd International Conference on Thermoelectrics – ICT 2014, Nashville, Tennessee, USA, 6 July to 10 July 2014.
19. 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.
20. H. Rotella, M. Morales, P. Roussel, **H. Ouerdane**, D. Chateigner, P. Boullay, L. Lutterotti, and W. Prellier.  
*Structure refinement of strained LaVO<sub>3</sub> thin film.*  
Oral presentation at the 13th European Powder Diffraction Conference, Grenoble, France, 28 to 31 October 2012.
21. Y. Apertet, **H. Ouerdane**, C. Goupil, and Ph. Lecoeur.  
*Internal convection in thermoelectric generator models.*  
Oral presentation at the 6th European Thermal Sciences Conference, Eurotherm 2012, Poitiers Futuroscope, France, 4 to 7 September 2012.
22. Y. Apertet, **H. Ouerdane**, C. Goupil, and Ph. Lecoeur.  
*Coupling thermoelectric generator with environment: impact on performances.*  
Oral presentation at the Phonons and fluctuations 3rd workshop, San Feliu De Guixols, Gérone, Spain, 21 to 24 May 2012.
23. **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.
24. **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.
25. L. Pilozzi, M. Glazov, **H. Ouerdane**, A. V. Kavokin, G. Malpuech, and A. d'Andrea.  
*Optical nonlinearities in polariton-polariton scattering: beyond the bosonization schemes.*  
Invited oral presentation at the International School on Complex Phenomena in Nonlinear Physics, Erice, Italy, 3-7 October 2009.
26. B. Gervais, M. Beuve, G. H. Olivera, M. E. Galassi, R. D. Rivarola, and **H. Ouerdane**.  
*Simulation of water radiolysis by swift ions.*  
Oral presentation at the Journée Radiolyse du GNR PARIS, Ecole des Mines de Nantes, Nantes, France, 12 June 2009.

27. L. Pilozzi, M. Glazov, **H. Ouerdane**, A. V. Kavokin, G. Malpuech, and A. d'Andrea.  
*Polariton-polariton scattering in microcavities: A microscopic theory.*  
Oral presentation at the 9th International Conference on Physics of Light-Matter Coupling in Nanostructures, Lecce, Italy, 16 -20 April 2009.
28. G. Malpuech, D. D. Solnyshkov, **H. Ouerdane**, M. Glazov and I. Shelykh.  
*Anderson glass and superfluid phases of cavity polaritons.*  
Oral presentation at the International Conference on the Physics of Semiconductors 2008, Rio de Janeiro, Brazil, 27 July - 1st August 2008.
29. G. Malpuech, D. D. Solnyshkov, **H. Ouerdane**, M. Glazov and I. Shelykh.  
*Bose glass and superfluid phases of cavity polaritons.*  
Poster presentation at the Latsis Symposium on Bose Einstein Condensation in Dilute Atomic Gases and in Condensed Matter, EPFL, Switzerland, January 2008.
30. 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.
31. **H. Ouerdane**.  
*Polariton-carrier scattering in quantum-wells.*  
Oral presentation at the 2<sup>nd</sup> International School on Nanophotonics, Maratea, Italy, September 2007.
32. **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.
33. D. D. Sonyshkov, 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.
34. 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.
35. 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.
36. S. Fahy, A. Lindsay, **H. Ouerdane** and E. P. O'Reilly.  
*Quasi-localized states, electron scattering and carrier mobility in GaN<sub>x</sub>As<sub>1-x</sub>.*  
Invited oral presentation at the American Physical Society March Meetings, March 2005.
37. **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.
38. **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.
39. **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.
40. **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.