Grégoire ITHIER

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EDUCATION AND QUALIFICATIONS

2002-2006
- PhD thesis (Paris VI Uni.) Awarded 3rd January 2006.

Supervisor: **D. Esteve**. Laboratory: **SPEC, CEA-Saclay**.
Experimental study of a prototype of quantum bit using superconducting circuits : "Manipulation of the quantum state, measurement of the state and modelling of the decoherence phenomenon". « Mention Très Honorable avec félicitations du jury ».

2002
- Diplôme d'Etudes Approfondies (eq. MSc) « Physique des Solides et Milieux denses », rank 1 over 40, Orsay Univ.

2002
- « Agrégation de Sciences Physiques option Physique ».

National French examination for teaching physical sciences at undergraduate level. Admitted (rank 33 over 1000 candidates).

1998-2002
- Student at the « Ecole Normale Supérieure de Lyon », Magistère des Sciences de la Matière (eq MSci).

1997-1998
- « Mathématiques Spéciales » Lycée Pasteur.

Admitted at "ENS-Lyon" and "Ecole Polytechnique"

EMPLOYMENT

2011-pres
- **Lecturer**, Physics Department, Royal Holloway.
  - *Teaching*: Atomic and Nuclear Physics lecture (2nd year of study, 2013-2019), Atomic Physics lecture (3rd year of study, 2021-pres), Electromagnetism lecture (2nd year of study, 2022-pres), Mathematica training course (3rd year of study 2016-2022), 3rd year Project organization and planning (2012-2022), Mentoring of Second year students (6-8 students per year, 2013-pres)
  - *PhD supervision*: Saeed Ascroft (2015-2019), Rémi Lefèvre (2020-pres).
  - *PostDoc supervision*: Dr K. de Zawadzki (2021-2022), Dr H. Lee (2023-pres)

2009-2011
- "Leverhulme Trust" Fellow, Physics Department, Royal Holloway (RHUL).

2006-2008
- Postdoc, Physics Department, Royal Holloway. Supervisor: P. Meeson. Building of a new laboratory and setting of a new experiment using superconducting quantum circuits (cryogenics, microwave engineering, nanofabrication). Area of research : detection of single microwave photons.

2002-2005
- University of Orsay, France : « moniteur » (teaching assistant). Laboratory session courses in electromagnetism, optics, thermodynamics, acoustics and atomic physics (level: 1st and 2nd year).

SKILLS AND ACTIVITIES

- Superconducting quantum bit design and modelling, cf publications [1, 2, 3, 4, 5, 6, 7].
- Nanofabrication: optical and e-beam lithography, thin film deposition [1, 2, 3, 4, 5, 6, 7].
- Cryogenics (He4-He3 dilution refrigerator) [1, 2, 3, 4, 5, 6, 7].
- Low noise microwave measurements using High Electron Mobility Transistors (HEMTs) and Josephson Bifurcation Amplifiers [1, 2, 3, 4, 5, 6, 7].
- Graphical Processor Unit CUDA [9, 10, 11] and Python [8] programming: numerical integration of the Schrödinger equation by exact diagonalization.
- Wolfram Mathematica programming (daily use).

- Referee for the American Physical Society and Institute of Physics journals.
- Referee for the French Research Funding Agency (ANR).
- Referee for the UKRI EPSRC funding agency

PUBLICATIONS (selected)

- *12. Third Sound detectors in accelerated motion.*
C.R.D Bunney, S. Biermann, V. S. Barroso, A. Geelmuyden, C. Gooding, **G. Ithier,** X. Rojas, J. Louko and S. Weinfurtner, arXiv:2302.12023

- *11. Many Body Density of States of a system of non interacting spinless fermions.*
R. Lefevre, K. de Zawadzki and **G. Ithier**, New Journal of Physics, 25, 063004 (2023). arXiv:2208.02236

- *10. Statistical diagonalization of a random biased Hamiltonian: the case of the eigenvectors.*
G. Ithier and S. Ascroft, Journal of Physics A: Mathematical and Theoretical **51**, 48 (2018).

- *9. Typical Equilibrium State of an embedded quantum system,*
G. Ithier, S. Ascroft and F. Benaych-Georges, Phys. Rev. E Rap. Comm. **96**, 060102, (2017).

- *8. Dynamical Typicality of an embedded quantum system,*
G. Ithier and F. Benaych-Georges, Phys. Rev. A, **96**, 012018 (2017).

- *7. Direct spectral analysis using a threshold detector with application to a superconducting circuit,*
G. Ithier, G. Tancredi and P. J. Meeson. New Journal of Physics 16, 055010 (2014).

- *6. Bifurcation, mode coupling and noise in a nonlinear multimode superconducting microwave resonator,*
G. Tancredi, **G. Ithier** and P.J. Meeson. Applied Physics Letters Vol. 103, No. 6, 063504 (2013).

- *5. Current to Frequency Conversion in a Josephson Circuit*,
F. Nguyen, N. Boulant, **G. Ithier,** P. Bertet, H. Pothier, D. Vion, and D. Esteve. Phys. Rev. Lett. 99, 187005 (2007).

- *4. Quantum Non Demolition Readout using a Josephson Bifurcation Amplifier,* **[41 citations]**
N. Boulant, **G. Ithier**, P. Meeson, F. Nguyen, D. Vion, D. Esteve, I. Siddiqi, R. Vijay, C. Rigetti, F. Pierre, and M. Devoret. Phys. Rev. B *76, 014525 (2007).*

- *3. Decoherence in a quantum bit superconducting circuit*. **[416 citations]**
G. Ithier, E.Collin, P. Joyez, P. Meeson, D. Vion, and D. Esteve, F. Chiarello, and A. Shnirman, Y. Makhlin, and G. Schön Phys. Rev. B 72, 134519 (2005).

- *2. Zener enhancement of quantum tunneling in a two-level superconducting circuit***[36 citations]**
G. Ithier, E. Collin, P. Joyez, D. Vion, D. Esteve, J. Ankerhold, and H. Grabert, Phys. Rev. Lett., 94, 057004 (2005).

- *1. NMR-like control of a quantum bit superconducting circuit.* **[104 citations]**
E. Collin, **G. Ithier**, A. Aassime, P. Joyez, D. Vion, and D. Esteve, Phys. Rev. Lett., 93, 157005 (2004).

OTHER OUTPUTS

- *Block oscillations in a Josephson circuits,* Boulant, N., **Ithier, G.**, Nguyen, F., Bertet, P., Pothier, H., Vion, D., Urbina, C. & Esteve, D., 2007, CONTROLLABLE QUANTUM STATES:

MESOSCOPIC SUPERCONDUCTIVITY AND SPRINTRONICS. SINGAPORE: WORLD SCIENTIFIC PUBL CO PTE LTD, p. 71-76

- *Fighting decoherence in a Josephson qubit circuit, Collin,* E., **G. Ithier**, Joyez, P., Vion, D. & Esteve, D., 2004, *Realizing Controllable Quantum States.* SINGAPORE: WORLD SCIENTIFIC PUBL CO PTE LTD, p. 247-254

BOOK CHAPTERS

- *Decoherence in a quantum bit circuit*. **Ithier, G**., Nguyen, F., Collin, E., Boulant, N., Meeson, P.J.,Joyez, P., Vion, D. & Esteve, D., 2007*, Quantum Decoherence: Poincare Seminar 2005. ed. / B Duplantier; JM Raimond; V Rivasseau. CAMBRIDGE : Birkhauser, Boston, 2007. p. 125-149.*

RESEARCH GRANTS AND CONTRACTS (AWARDED)

2020-2024 • Principal Investigator (PI) on a Leverhulme Trust Research Grant (£267 k awarded).

2020-2025 • Co-investigator on an STFC grant "Quantum Technologies for Fundamental Physics" with Dr. X. Rojas (RHUL). Amount awarded: £831k for the RHUL part (4.5M£ for the full project involving 14 applicants).

2009-2011 • PI on a Leverhulme Trust Early Career Fellowship (£120k awarded).

PRESENTATIONS (last 10 years)

Jun2023 • Workshop: Quantum Simulator for Fundamental Physics (QSimFP), Perimeter Institute, Waterloo Ontario, Canada (invited).

Mar 2023 • American Physical Society "March Meeting", Las Vegas US (contributed).

Dec 2022 • Seminar at the Service de Physique de l'Etat Condensé, CEA-Saclay (invited).

Aug 2022 • Frontiers in Quantum and Mesoscopic Thermodynamics conference, Prague (invited).

July 2019 • Seminar at Condensed Matter in the City workshop, London (invited).

Oct 2018 • Seminar at the Service de Physique de l'Etat Condensé, SPEC-CEA Saclay (invited).

April 2018 • Seminar at the Laboratoire Physique Théorique et Physique Statistique, Paris-Saclay Univ (invited).

Mar 2018 • Seminar at the Ludwig-Maximilians-Universität, Munich, Germany (invited).

Mar 2018 • "Quantum many body systems out of equilibrium" conference, Stellenbosch, South Africa (contributed).

Jul 2016 • StatPhys26 Conference, Lyon, France (contributed).

Dec 2015 • Seminar at Nottingham University, UK (invited).

Nov 2015 • Seminar at Capital Fund Management, Paris, (invited).

Nov 2015 • Third Conference on Quantum Thermodynamics, Porquerolles France (contributed).

July 2015 • Quantum dissipation: progress and perspective Conference, Fribourg Institute for Advanced Studies, Germany (invited).

August 2015 • Frontiers in Quantum and Mesoscopic Thermodynamics Conference, Prague, Czech Republic (invited).

Mar 2015 • American Phys. Soc. Meeting "March Meeting", San Antonio US (contributed).

Nov 2014 • Seminar Quantronics Group, CEA Saclay (invited).

PATENTS

2005 Device for reinitializing a quantum bit device having two energy states. Patent number: 6930318. Type: Grant. Filed: December 12, 2003. Date of Patent: August 16, 2005. Assignee: Commissariat à l'Energie Atomique. Inventors : D. Vion, D. Esteve, P. Joyez, H. Pothier, P.-F. Orfila, C. Urbina, E. Collin, G. Ithier.

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