Dr. Julien BASSET

Maître de Conférences
(Assistant Professor)

Born 11^{th} december 1984 in Privas (Ardèche - France), male, married, two children

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Work Experience

September 2014– Today
Assistant Professor in Experimental Condensed Matter Physics at Université Paris Saclay: "High frequency dynamics of mesoscopic systems"
Nanostructures at the nanosecond group - Laboratory for Solid State Physics, Orsay, France

December 2011– August 2014
Post-Doc in Experimental Condensed Matter Physics: "Dipole coupling semiconductor double quantum dots to microwave resonators: coherence properties and photon emission"
Klaus ENSSLIN's and Andreas WALLRAFF's quantum physics groups (Joint project) - Laboratory for Solid State Physics at ETH Zürich, Switzerland

October 2008 – October 2011
PhD Thesis in Experimental Condensed Matter Physics: "High frequency quantum noise of mesoscopic systems and current-phase relation of hybrid junctions"

Hélène BOUCHIAT's and Richard DEBLOCK's mesoscopic physics group - Laboratoire de Physique des Solides (CNRS - Université Paris Sud XI) Orsay, France

- Jury members :
  - Referee: Silvano De Franceschi (CEA Grenoble)
  - Referee: Norman Birge (Michigan State University)
  - Examiner: Benoît Douçot (LPTHE Paris)
  - Examiner: Christian Glattli (CEA Saclay)
  - President: Pascal Simon (Université Paris Sud)
  - Thesis co-director: Hélène Bouchiat (LPS Orsay)
  - Thesis co-director: Richard Deblock (LPS Orsay)

March 2008 – June 2008
Researcher Assistant (3 months): : "Spin transfer interactions in exchange-biased spin valves studied by mechanical point contact"
Maxim TSOI's spintronics group - Physics Department at the University of Texas at Austin, USA

June 2007 – September 2007
Process Engineer Assistant (3 months)
ALTIS Semiconductor - Chemical Mechanical Planarization service (2000 employees in a 55ha plant - Clean room class $10 : 25000m^2$*), Corbeil-Essonne, France*

April 2006 – July 2006
Researcher Assistant (4 months)
Hubert RENEVIER's Nanostructures and Synchrotron Radiance group - CEA Grenoble, France

Research Community

- **Organizer of the french "Groupement de Recherche Physique quantique mésoscopique" meeting (http://gdr-meso.neel.cnrs.fr/) held online with Zoom - 23-26 November 2020 - 156 participants**
- **Elected member (first alternate) of the Laboratoire de Physique des Solides council - from January 2020 for 4 years**
- **Laboratoire de Physique des Solides Nanofabrication facilities referring person for the NS2 group from January 2020**
- **Expert in scientific committees**
  - Member of examination committee for the PhD defense of Nicolas Bourlet (Quantronics group CEA Saclay)
  - Member of an Assistant professorship recruitment committee "Novel electronic states in quantum materials" (Section CNU 28 - Université Paris Sud). ≈ 60 candidates - spring 2019
  - Member of the poster prize committee of the "Colloque Alain Bouyssy" - winter 2017
- **Research funding**
  - Grant from DIM Sirteq (November 2020 - 170000€) with EPLA group at C2N Palaiseau (Francesca Chiodi)
  - Grant from Labex PALM (March 2020 - 18000€) with Quantronics group at CEA Saclay (Philippe Joyez)
  - Grant from Laboratoire de Physique des Solides (April 2015 - 18000€)
  - Grant from CNRS INP young researcher (July 2016 - 15000€)
- **Teaching funding**
  - Grant from Labex LaSips (Fall 2015 - 12000€)

- Grant from Labex NanoSaclay (Fall 2015 - 8000€)
- Grant from Labex Palm (Spring 2017 - 8000€)
- Grant from GIP-CNFM (Fall 2017 - 3360€)

- **Regular reviewer for Physical Review Letters and Physical Review B**
- **Research activity presentation for HCERES**
- **Accompanying person for french/german visiting students**
- **Author of two News and views article for the Laboratoire de Physique des Solides**
- **Maintenance and updates of the NS2 group *website***
- **Prices**
  - Ranked third at a technology contest organized by région île-de-france (**DIM Sirteq**) in front of a jury of valuation specialists (with Marco aprili and Jérôme Estève - 3000€) - 2019 (France)
  - **ETH award** for the improvement of the teaching experiment "'Josephson effect" - 2014 (Switzerland)
  - Best poster awarded by the **Wilhelm und Else Heraeus Foundation** at Bad Honnef conference on quantum dynamics in nanoscale heterostructures - 2010 (Germany)

Teaching experience and student supervision

- **Training project and educational innovation**
  - Development of a new labclass platform allowing Nanophysics Master 2 students from Université Paris Saclay to **fabricate graphene hallbars** in a clean room environment (C2N) and measure the **quantum Hall effect** (LPS). This project was co-funded by Labex PALM, Labex NanoSaclay, LaSips and the GIP-CNFM (**31360€**) and is a mandatory lecture for Nanophysics students.
  - Introduction of the smartphone application "Phyphox" to teach physics of waves, mechanics and methodology.
  - **French translation of the smartphone application "Phyphox"** in collaboration with Frédéric Bouquet (Université Paris Saclay) and Ulysse Delabre (Université de Toulouse)
  - Introduction of tutorials in exercise classes of mechanics I.
  - Active popularization of Physics experiments to do at home with a smartphone (Twitter @jujulinter).
  - Introduction of videos posted on YouTube for the correction of mechanics II exercises. `https://www.equipes.lps.u-psud.fr/ns2/TeachingJB2.shtml#mec1`
  - Development and implementation of a Master 1 level python-based numerical Monte-Carlo project on the classical Ising model

- **PhDs' student supervision**
  - Ognjen Stanisavljeviç (Université Paris Saclay - 2020 → 2023) - "High kinetic inductance-based single microwave photon detection" (co-supervision)
  - Marko Kuzmanoviç (Université Paris Saclay - 2017 → 2019) - "Non-adiabatic dynamics of diffusive Josephson junctions" (co-supervision)
  - Pierre Février (Université Paris Sud - 2014 → 2015) - "Quantum fluctuations at optical frequencies in tunnel junctions" (co-supervision)
  - Anna Stockklauser (ETH Zürich - 2013 → 2014) -"Strong coupling circuit QED with semiconductor quantum dots" (co-supervision)

- **Trainees' student supervision**
  - Axel-Adrien Robert (Master 1 student from Univ. Paris Saclay)- "Monte Carlo simulation of the classical 2D Ising model (2 months, confined)"
  - Mohamed Dekar (Master 1 student from Univ. Paris Saclay)- "Monte Carlo simulation of the classical 2D Ising model (2 months, confined)"
  - Sali Salama (Master 1 student from Univ. Paris Saclay)- "Hybrid superconducting/normal junctions for charge detection (2 months)"
  - Naveen Dhami (Master student from Indian Institute of Technology Bombay, India)- "Probing Ferromagnetic resonance of YIG thin films with a diffusive Josephson junction (3 months)"
  - Charles Rigoudy (Master 1 student from Univ. Paris Sud)- "Superconducting photon detectors to detect plasmonic emission (3 months)"
  - Kristian Cujia Pena (Master student from ETH Zürich) - "Photon emission in a cavity-coupled double quantum dot" (5 months)
  - Anna Stockklauser (Master student from ETH Zürich) - "Few electron double quantum dot for a circuit QED architecture"
  - David Dominik-Jarausch (Master student from ETH Zürich) - "Quantum dots in a hybrid superconducting-semiconducting architecture" (5 months)
  - Sebastian Bütz (Master student from ETH Zürich) - "Double quantum dot without plunger gates for a circuit QED architecture" (5 months)
  - Tiziano Müller (shared Bachelor student from Universitat Zürich) - "Modeling of the electrosatic confinement potential in laterally defined double quantum dot systems" (3 months)
  - Johann Mattiat (Bachelor student from ETH Zürich) - "Development of a new Josephson setup for the VP experiment" (4 months)

- **Practicals in a clean room environment on graphene Hall bars fabrication and measurement at low temperature of the quantum Hall effect (Master level, Université Paris Saclay)**
- **Practicals in superconductivity (Master level, Université Paris Saclay)**
- **Python-based numerical Monte-Carlo project on the classical Ising model (Master level, Université Paris Saclay)**
- **Practicals in a clean room environment on carbon nanotube transistor fabrication and measurement (Master level, Université Paris Saclay)**
- **Free physics projects: project-based lecture with Arduino or others (undergraduate level (L3S2), Université Paris Saclay)**
- **Lectures in methodology : problem solving, logic, orders of magnitudes, oral presentation, computer skills... (undergraduate level (L1S2), Université Paris Saclay)**
- **Exercises in basic mechanics II (undergraduate level (L1S2), Polytech' Paris Saclay)**
- **Exercises in basic mechanics I (undergraduate level (L1S1), Université Paris Saclay)**
- **Lectures, practicals and Exercises in waves (undergraduate level, Polytech' Paris Saclay)**
- **Exercises in semiconductor nanostructures (Pr. Dr. IHN Thomas' lecture, Master level, ETH Zürich, in English)**
- **Practicals on the Shot Noise (undergraduate level, ETH Zürich, in English)**
- **Practicals on the Josephson effect (undergraduate level, ETH Zürich, in English)**
- **Practicals and Exercises in basic optics and mechanics (undergraduate level, Université Paris Sud XI)**
- **Practicals on the Zeeman effect (undergraduate level, Université Paris Sud XI)**
- **Scientific speaker for tourists and schoolchildren (2 months $\times 1/2$ day, Conseil général des Hautes-Alpes/ Université Joseph Fourier Grenoble)**

Academic Background

Double degree: Master 2 "Nanophysics, Nanosciences and Nanostructures" + Engineer degree of the Grenoble Institute of Technology, 'with distinction, ranked first' University Joseph Fourier Grenoble I (UJF) and Grenoble Institute of Technology (ENSPG), Grenoble (France)	2007–2008
Second year of the Grenoble Institute of Technology (ENSPG), 'with distinction' Speciality in Functionalized Materials and Nanophysics (MFN) Grenoble Institute of Technology (ENSPG), Grenoble (France)	2006–2007
First year of Master in Physics and Chemistry, 'with distinction' University Joseph Fourier, Grenoble (France)	2005–2006
Bachelor degree in Physics and Chemistry, 'with distinction' University Joseph Fourier, Grenoble (France)	2004–2005
A two-year university degree in the Sciences of Matter (undergraduate studies), 'with distinction' University Joseph Fourier, Valence (France)	2002–2004

Specific Skills

- **Technical:**
  - Low temperature and low noise measurements (dilution fridge, lock-in amplifier, voltage and current amplifiers, Tesla range magnetic field, High frequency irradiation...) - Radiofrequency heterodyne/homodyne measurements - Optical lithography - Electronic lithography and Scanning Electron Microscopy observation - Chemical Vapor Deposition of carbon nanotubes - High vacuum metal and oxide sputtering and evaporation (Pd, Al, Nb, Ti, Au, PdNi,Al_20_3...) - Chemical etching of GaAs substrates - Physical plasma etching - Ohmics annealing for GaAs/GaAlAs 2DEGs - Reactive ion etching - AFM imaging
- **Languages:**
  - French : native speaker - English : useful working knowledge - Italian : basic grounding - Spanish : basic grounding
- **Computer science:**
  - Control of Excel, Word, PowerPoint, LaTeX, Windows and Linux. - Foundations in programming languages: Mathematica, python, Matlab. - Modelling and connections: AutoCad, DesignCad, LEdit, Maxwell, Femlab, Labview, Arduino, html, Sonnet, Origin, Igor. - Distant working tools: Zoom, blackboard collaborate, e-campus, OBS Studio...

Supplementary informations

- Driving Licence A (motorcycle) and B (car)
- Active member of the Motorcycle Club of Privas (France)- Competitor for the Rhône-Alpes and France Enduro Championship for 5 years (motorcycle)

- Regular motorcycle mechanics and follower for the world and french enduro championship
- Football sports-study program for 4 years
- Table tennis competition for 2 years
- Leisure badminton player
- Various seasonal jobs: farm worker, stock controller, floorwalker, scientific speaker...

Schools and Conferences

- **Broad audience talks**
  - Colloque Alain Bouyssy (Orsay - February 2015)- "Le bruit électronique comme source de lumière"
  - LPS' days (February 2018) - "Academia after a PhD at LPS: an example"

- **Invited Conferences**
  - Annual meeting of the french **GDR Quantum Mesoscopic Physics Aussois 2019** - "Non-adiabatic Dynamics of Strongly Driven Diffusive Josephson Junctions"
  - Collaborative Conference on Materials Research (CCMR) 2014 held in Seoul (South Korea - June 2014)- "Photon emission and statistics in a cavity-coupled double quantum dot"
  - Workshop **Quantum Innovators** held at the *University of Waterloo* (Canada - January 2014)- "Single-electron double quantum dot dipole-coupled to a microwave resonator"
  - Workshop **New frontiers in the physics of quantum dots** held at the *Landau institute in Chernogolovka* (Russia - September 2012)- "Dipole coupling a double quantum dot to a microwave resonator"
  - Annual meeting of the french **GDR Quantum Mesoscopic Physics 2011** - "Measurement of Quantum Noise in a carbon nanotube quantum dot in the Kondo regime"
  - Annual meeting of the french **GDR Quantum Mesoscopic Physics 2010** - "Emission and Absorption Quantum Noise measurement with an on-chip resonant circuit"

- **Contributed talks**
  - **WE-Heraeus-Seminar on Superconductivity in Low-Dimensional and Interacting Systems** held at Bad Honnef (Germany - June 2019) - "Dynamics of Strongly Driven Diffusive Josephson Junctions"
  - Annual meeting of the french **GDR Quantum Mesoscopic Physics 2014** - "Photon emission and statistics in a cavity-coupled double quantum dot"
  - International Conference on the Physics of Semiconductors (ICPS) 2014 held in Austin (USA - August 2014)- "Photon emission and statistics in a cavity-coupled double quantum dot"
  - **Frontiers in quantum engineered devices** held at *Obergurgl* (Austria - August 2013)- "Dipole-coupling a single-electron double quantum dot to a single photonic mode"
  - Les rencontres du Vietnam on **Nanophysics: from fundamentals to applications** held at *Quy-Nhon* (Vietnam - August 2013)- "Dipole-coupling a single-electron double quantum dot to a microwave resonator"

- **Invited Seminars**
  - **Semiconductor Quantum Physics (Seigo Tarucha) group at University of Tokyo** (June 2014)- "Photon emission and statistics in a cavity-coupled double quantum dot"
  - **Mesoscopic Physics (Kensuke Kobayashi) group at University of Osaka** (June 2014)- "Photon emission and statistics in a cavity-coupled double quantum dot"
  - **Laboratoire Pierre Aigrain at ENS Paris** (February 2014)- "Single-electron double quantum dot dipole-coupled to a single photonic mode"
  - **Mesoscopic Physics (Peter Samuelsson) group at Lund University** (October 2013)- "Single-electron double quantum dot dipole-coupled to a single photonic mode"
  - **Laboratoire de Physique des Solides at University Paris Sud** (April 2013)- "Towards controllable electron-photon interaction and their entanglement"
  - **Nanophysics (Klaüs Ensslin) group at ETH Zürich** (May 2011)- "Emission and Absorption quantum noise measurement with an on-chip resonant circuit"
  - **Quantum devices (Andreas Wallraff) group at ETH Zürich** (June 2011)- "Emission and Absorption quantum noise measurement with an on-chip resonant circuit"
  - **Quantum Transport group (Leo Kouwenhoven) at TU Delft** (May 2011)- "Emission and Absorption quantum noise measurement with an on-chip resonant circuit"
  - **Service de Physique de l'Etat Condensé (SPEC) at CEA Saclay** (December 2010) - "Emission and Absorption quantum noise measurement with an on-chip resonant circuit"

- **Posters**
  - **High Kinetic Inductance Microwave Resonators Made by He-Beam Assisted Deposition of Tungsten Nanowires** - J. Basset, D. Watfa, G. Aiello, M. Fechant, A. Morvan, J. Esteve, J. Gabelli, M. Aprili, R. Weil, A. Kasumov, H. Bouchiat and R. Deblock - (presented to WE-Heraeus-Seminar on Superconducting Kinetic Inductances in Bad Honnef 2019)
  - **Measurement of the electronic quantum shot noise at optical frequencies** P. Février, J. Basset, J. Gabelli (presented to the GDR Mesoscopic Physics 2014).
  - **Investigating transport in GaAs/AlGaAs and InAs/GaSb heterostructures** S. Müller, F. Nichele, A. Nath Pal, P. Pietsch, C. Charpentier, A. Hofmann, C. Rössler, T. Krähenmann, J. Basset, A. Stockklauser, D. Jarausch, T. Frey, C. Reichl, W. Wegscheider, K. Ensslin, T. Ihn, and A. Wallraff (presented to the NCCR QSIT meeting in Arosa 2014).
  - **Circuit quantum electrodynamics with single electron quantum dots** J. Basset, A. Stockklauser, J. Basset, A. Wallraff, T. Ihn, K. Ensslin, C. Reichl and W. Wegscheider (presented to the NCCR QSIT evaluation in Zürich 2013)

- **Single-electron charge qubit in a circuit QED architecture** J. Basset, T. Frey, D.-D. Jarausch, A. Stockklauser, T. M. Ihn, K. Ensslin and A. Wallraff (presented to the NCCR QSIT meeting in Arosa 2013)
- **Coupling of a semiconductor double quantum dot to a microwave resonator** J.Basset, T. Frey, A. Stockklauser, C. Rössler, T. M. Ihn, K. Ensslin and A. Wallraff (Presented in Dresden at the workshop on Quantum Noise and Measurement in Engineered Electronic Systems 2012 and ICPS conference in Zürich 2012)
- **Using high frequencies to probe semiconducting nanostructures** J. Basset, S. Hellmüller, T. Müller, T. Frey, P.J. Leek, C. Rössler, T. M. Ihn, K. Ensslin and A. Wallraff (presented to the NCCR QSIT meeting in Arosa 2012)
- **Josephson effect** - J. Basset (presented at the Physics department day at ETH Zürich)
- **"Emission and Absorption quantum noise measurement with an on-chip resonant circuit** - J. Basset, H. Bouchiat and R. Deblock (presented to ESONN School 2010, to Bad Honnef conference on quantum dynamics in nanoscale heterostructures 2010 and to "Les rencontres de Moriond" at La Thuile (Italy) on quantum mesoscopic physics 2011)
- **Very high frequency quantum noise detection in mesoscopic systems** - J. Basset, H. Bouchiat and R. Deblock (presented to GDR Graphene Nanotubes and GDR Mesoscopic Physics 2009)

Publications

- **Assistant-Professorship**

20. **Quantum noise in carbon nanotubes as a probe of correlations in the Kondo regime** - M. Ferrier, R. Delagrange, J. Basset, H. Bouchiat, T. Arakawa, T. Hata, R. Fujiwara, Y. Teratani, R. Sakano, A. Oguri, K. Kobayashi and R. Deblock - *Journal of Low temperature Physics 10, 1007 (2019)*
19. **Non-adiabatic Dynamics of Strongly Driven Diffusive Josephson Junctions** - J. Basset, M. Kuzmanovic, P. Virtanen, T. T. Heikkila, J. Esteve, J. Gabelli, C. Strunk and M. Aprili - *Phys. Rev. Research (R) 1, 032009 (2019)*
18. **High Kinetic Inductance Microwave Resonators Made by He-Beam Assisted Deposition of Tungsten Nanowires** - J. Basset, D. Watfa, G. Aiello, M. Fechant, A. Morvan, J. Esteve, J. Gabelli, M. Aprili, R. Weil, A. Kasumov, H. Bouchiat and R. Deblock - *App. Phys. Lett. 114, 102601 (2019)*
17. **Microwave Signature of Topological Andreev level Crossings in a Bismuth-based Josephson Junction** - A. Murani, B. Dassonneville, A. Kasumov, J. Basset, M. Ferrier, R. Deblock, S. Gueron and H. Bouchiat - *Phys. Rev. Letters 122, 076802 (2019)*
16. **Emission noise and high frequency cut-off of the Kondo effect in a quantum dot** - R. Delagrange, J. Basset, H. Bouchiat, R. Deblock - *Phys. Rev. B (R) 97, 041412 (2018)*

- **Post-doc**

15. **Heat dissipation and fluctuations in a driven quantum dot** A. Hofmann, V. F. Maisi, J. Basset, C. Reichl, W. Wegscheider, T. Ihn, K. Ensslin, C. Jarzynski - *Phys. Stat. Sol. B 10.1002/pssb201600546 (2016)*
14. **Measuring the degeneracy of discrete energy levels using a GaAs/AlGaAs quantum dot** A. Hofmann, V. F. Maisi, C. Gold, T. Kraehenmann, C. Roessler, J. Basset, P. Maerki, C. Reichl, W. Wegscheider, K. Ensslin, T. Ihn - *Phys. Rev. Lett 117, 206803 (2016)*
13. **Spin orbit coupling at the level of a single electron** V. F. Maisi, A. Hofmann, M. Roosli, J. Basset, C. Reichl, W. Wegscheider, T. Ihn, K. Ensslin - *Phys. Rev. Lett 116, 136803 (2016)*
12. **Microwave Emission from Hybridized States in a Semiconductor Charge Qubit** A. Stockklauser, V. Maisi, J. Basset, K.Cujia, C. Reichl, W. Wegscheider, T. M. Ihn, A. Wallraff and K. Ensslin - *Phys. Rev. Lett. 115, 046802 (2015)*
11. **Equilibrium free energy measurement of a confined electron driven out of equilibrium** A. Hofmann, V. Maisi, C. Rossler, J. Basset, P. Marki, T. Ihn, K. Ensslin, C. Reichl and W. Wegscheider - *Phys. Rev. B 93, 035425 (2016)*
10. **Spectroscopy of Equilibrium and Non-Equilibrium Charge Transfer in Semiconductor Quantum Structures** C. Roessler, S.Burkhard, T.Kraehenmann, M. Roessli, P. Maerki, J. Basset, T. Ihn, K. Ensslin, C. Reichl, and W. Wegscheider *Phys. Rev. B 90, 081302(R) (2014)*
9. **Evaluating charge noise in the circuit quantum electrodynamics architecture with semiconductor quantum dots** J. Basset, A. Stockklauser, D.-D. Jarausch, T. Frey, C. Reichl, W. Wegscheider, A. Wallraff, K. Ensslin and T. M. Ihn - *Appl. Phys. Lett. 105, 063105 (2014)*
8. **Single-electron double quantum dot dipole-coupled to a single photonic mode** J. Basset, D.-D. Jarausch, A. Stockklauser, T. Frey, C. Reichl, W. Wegscheider, T. M. Ihn, K. Ensslin and A. Wallraff - *Physical Review B 88, 125312 (2013)*

- **PhD degree**

7. **Measurement of quantum Noise in a carbon nanotube quantum dot in the Kondo regime** J. Basset, H. Bouchiat and R. Deblock - *Physical Review Letters 108, 046802 (2012) "Editor's suggestion"*
6. **High frequency quantum admittance and noise measurement with an on-chip resonant circuit** J. Basset, H. Bouchiat and R. Deblock - *Physical Review B 85, 085435 (2012)*
5. **Emission and absorption quantum noise measurement with an on-chip resonant circuit** J. Basset, H. Bouchiat and R. Deblock - *Physical Review Letters 105, 166801 (2010)*

4. **Joint measurement of current-phase relations and transport properties of hybrid junctions using a three junctions superconducting quantum interference device** J. Basset, R.Delagrange, R. Weil, A. Kasumov, H. Bouchiat and R. Deblock - *J. Appl. Phys. 116, 02431 (2014)*

- **Master degree internship**

3. **Current-induced reorientation of exchange bias on a nanoscale** J. Basset, Z. Wei and M. Tsoi - *IEEE Transactions on magnetics, Vol. 46, No. 6, pp. 1770-1772 (2010)*
2. **Spin transfer interactions in exchange-biased spin valves** Z. Wei, J. Basset, J. Bass and M. Tsoi - *Journal of Applied Physics 105,07D108 (2009)*
1. **Towards antiferromagnetic metal spintronics** J. Basset, Z. Wei, J. Bass and M. Tsoi - *Proc. of SPIE Conference Vol 7036,703605 (2008)*