

# Alexis Jouan

PhD in Physics



CMQED - LPEM - [ESPCI Paris - PSL](#)  
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Assistant Professor  
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Date of birth : 21/05/1989  
Nationality : French  
French Driving Licence (2017)

## RESEARCH EXPERIENCE

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**2022 - today** **Assistant Professor at [CMQED - LPEM](#), ESPCI Paris - PSL, France**  
*Current*

Condensed Matter Physics in the THz regime

**2020 - 2022**

*(2 years)*

**Postdoc at [Quantum Circuit Group](#), Lyon, France**

Superconducting qubit for quantum thermodynamics,  
Adv : Benjamin Huard, ENS Lyon

**2018 - 2020**

*(2 years)*

**Postdoc at [The University of Sydney](#), Sydney, Australia**

Dispersive Gate sensing for readout and Josephson junctions in topological materials,  
Adv : David Reilly, The University of Sydney and Microsoft

**2013 - 2017**

*(3.5 years)*

**PhD in Physics at [ESPCI](#), Paris, France**

Control of Superconductivity in a Two-dimensional Electron Gas at Oxides interfaces,  
Adv : Pr. Jérôme Lesueur and Dr. Nicolas Bergeal, ESPCI, Paris

**2013 - 2017**

*(3.5 years)*

**Labwork tutor - Quantum Physics**

Optical pumping in Rb gas  
Master students at ESPCI, Paris

**2012**

*(6 months)*

**Master Internship**

Properties of Majorana fermions wave functions in supercurrent-operated nanostructures  
Adv. : Pr. Felix Von Oppen, Dr. Alessandro Romito, Dahlem Center for Complex Quantum Systems and Fachbereich Physik, Freie Universität Berlin

**2011**

*(2 months)*

**Undergraduate Research Internship**

Design and setup of a magneto-optical trap  
Adv. : Pr. Frédéric Chévy, Dr. Diogo Fernandez, LKB lab, ENS, Paris

## EDUCATION

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**2012 - 2013** **Condensed Matter Physics Master 2 - [ICFP](#)**  
[Ecole Normale Supérieure \(ENS\)](#), Paris

**2010 - 2012 Bachelor of Science in Fundamental Physics**  
[Ecole Normale Supérieure \(ENS\)](#), Paris

**2007 - 2010 Mathematics and Physics Prep School**  
Lycée Condorcet and Lycée Louis Le Grand, Paris, France

## SCIENTIFIC PUBLICATIONS

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*Multiband Effects in the Superconducting Phase Diagram of Oxide Interfaces* [A. Jouan](#), S. Hurand, G. Singh, E. Lesne, A. Barthélémy, M. Bibes, C. Ulysse, G. Saiz, C. Feuillet-Palma, J. Lesueur and N. Bergeal [Advanced Materials Interfaces](#)

*Two-gap  $s\pm$ -wave superconductivity at an oxide interface* G. Singh, G. Venditti, G. Saiz, G. Herranz, F. Sanchez, A. Jouan, C. Feuillet-Palma, J. Lesueur, M. Grilli, S. Caprara and N. Bergeal [Physical Review B](#)

*Josephson junctions via anodization of epitaxial Al on an InAs heterostructure* [A. Jouan](#), J.D.S Witt, G.C. Gardner, C. Thomas, T. Lindemann, S. Gronin, M.J. Manfra and D.J. Reilly [Appl. Phys. Lett. 119, 172601 \(2021\)](#)

*Quantized conductance in a one-dimensional ballistic oxide nanodevice* [A. Jouan](#), G. Singh, E. Lesne, D.C. Vaz, M. Bibes, A. Barthélémy, C. Ulysse, D. Stornaiuolo, M. Salluzo, S. Hurand, J. Lesueur, C. Feuillet-Palma and N. Bergeal, [Nature Electronics \(2020\)](#)

*Gap suppression at a Lifshitz transition in a multi-condensate superconductor* G. Singh, [A. Jouan](#), G. Herranz, M. Scigaj, F. Sanchez, L. Benfatto, S. Caprara, M. Grilli, G. Saiz, F. Couëdo, C. Feuillet-Palma, J. Lesueur, N. Bergeal, [Nature Material \(2019\)](#)

*Gate-based single-shot readout of spins in silicon* A. West, B. Hensen, A. Jouan, T. Tanttu, C.-H. Yang, A. Rossi, M. F. Gonzalez-Zalba, F. Hudson, A. Morello, D. J. Reilly, A. S. Dzurak, [Nature nanotechnology \(2019\)](#)

*Josephson-like dynamics of the superconducting  $LaAlO_3/SrTiO_3$  interface*, S. Hurand, [A. Jouan](#), E. Lesne, G. Singh, C. Feuillet-Palma, M. Bibes, A. Barthélémy, J. E. Villegas, J. Lesueur, N. Bergeal. [Physical Review B \(99\), 104515](#)

*Competition between electron pairing and phase coherence in superconducting interfaces*, [A. Jouan](#), G. Singh, S. Hurand, J. Biscaras, C. Feuillet-Palma, G. Singh, R. Budhani, S. Caprara, M. Grilli, L. Benfatto, J. Lesueur, N. Bergeal. [Nat. Comm. vol. 9, 407 \(2018\)](#)

*DC and AC transport in field-effect controlled  $LaAlO_3/SrTiO_3$  interface*, A. Jouan [PhD Thesis, Paris 6, 2017](#)

*High-temperature superconducting nano-meanders made by ion irradiation*, P. Amari, C. Feuillet-Palma, A. Jouan, F. Couëdo, N. Bourlet, E. Géron, M. Malnou, L. Méchin, A. Sharafiev, J. Lesueur, N. Bergeal [Superconductor Science and Technology, 2017](#)

*Effect of disorder on superconductivity and Rashba spin-orbit coupling in  $LaAlO_3/SrTiO_3$  interfaces*, G. Singh, [A. Jouan](#), S. Hurand, C. Feuillet-Palma, P. Kumar, A. Dogra, R. Budhani, J. Lesueur, N. Bergeal. [Physical Review B vol. 96, 2017](#)

*Top-Gated field-effect  $LaAlO_3/SrTiO_3$  devices made by ion-irradiation*, S. Hurand, [A. Jouan](#), C. Feuillet-Palma, G. Singh, E. Lesne, N. Reyren, A. Barthélémy, M. Bibes, J.E. Villegas, C. Ulysse, M. Pannetier-Lecoer, M. Malnou, J. Lesueur, N. Bergeal, [Applied Physics Letters vol. 108, 2016](#)

*Engineering two-dimensional superconductivity and Rashba spin-orbit coupling in  $LaAlO_3/SrTiO_3$  quantum wells by selective orbital occupancy*, G. Herranz, G. Singh, N. Bergeal, [A. Jouan](#), J. Lesueur, J. Gázquez, M. Varela, M. Scigaj, N. Dix, F. Sánchez, J. Fontcuberta, [Nat. Com. vol. 6, 2016](#)

*Field-effect control of superconductivity and Rashba spin-orbit coupling in top-gated  $LaAlO_3/SrTiO_3$  devices* S. Hurand, [A. Jouan](#), C. Feuillet-Palma, G. Singh, J. Biscaras, E. Lesne, N. Reyren, A. Barthélémy, M. Bibes, J.E. Villegas, C. Ulysse, X. Lafosse, M. Pannetier-Lecoer, S. Caprara, M. Grilli, J. Lesueur, N. Bergeal, [Scientific Report vol. 5, 2015](#)

## PUBLICATIONS IN PREPARATION

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*Cavity-photon induced state transitions in a Fluxonium qubit*, [A. Jouan](#), J. Stevens, A. Bienfait, B. Huard In Preparation

## CONFERENCES AND WORKSHOPS

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- 11/2020**      **Biannual Meeting of the French research community on Mesoscopic Physics**  
*Aussois, France : Oral presentation on quantum capacitance measurements in a spin qubit and in a quantum point contact*
- 12/2015**      **Biannual Meeting of the French research community on Mesoscopic Physics**  
*Aussois, France : Oral presentation on Field effect control of superconductivity and Rashba spin-orbit coupling in top gated LaAlO<sub>3</sub>/SrTiO<sub>3</sub> devices*
- 04/2015**      **Capri Spring School on Transport in Nanostructures, with special focus on Topological superconductivity**  
*Capri, Italy : One week school*
- 03/2015**      **APS March Meeting 2015**  
*San Antonio, USA : Oral presentation*
- 08/2014**      **Condensed Matter in Paris CMD25**  
*Paris, France : Poster*
- 06/2014**      **The New generation in Strongly Correlated Electrons Systems 2014**  
*Nice, France : Poster*

## SKILLS AND EXPERTISE

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- Social skills**
- Collaboration with other groups during PhD ([La Sapienza](#), Roma), oxyde film growth ([CNRS-Thales](#), Palaiseau), clean-room facilities ([LNP](#) Marcoussis, [Nanoscience Hub](#)), ions implantation (InESS, Strasbourg)
  - Teaching labworks and tutorials at ESPCI and at the University of Sydney
  - Working in a big team driven by a world leading company (Microsoft)
  - Music and theater : study of clarinet for 13 years in Conservatory (CFEM diploma), theater and music hall performances, dance
  - Student organisation : leader of Webradio [trENSmissions](#) at ENS
- Technical skills**
- **Cryogenics** : Dilution refrigerator He-Free Pulse Tube Systems
  - **Low-noise DC Transport Measurements**, High Magnetic Fields (7T) with superconducting coil
  - **High Frequency Measurements** : Design and Realisation of PCB, Vector Network Analyzer (VNA), calibration of RF setup

- **Micro- and Nanofabrication** : Optical and advanced E-Beam lithography, Clean Room Thin Films Deposition Processes (E-beam and Joule Metal Evaporation, RF sputtering for Dielectrics, Etching, Annealing, Lift-off), Thin Films Characterization (Atomic Force Microscope, Profilometer, Scanning Electron Microscope, Polarized Optical Microscope), High-Energy (50keV) Ion implantation in collaboration with InESS in Strasbourg

## **Computer skills**

- Simulations on computer cluster, Matlab, Python, Qcodes, Mathematica, Origin, Comsol (electromechanical simulations), HFSS, Labview, Layout Editor, E-Line (e-beam lithography design), C++, html, LaTeX, Word, Excel

## **Sport**

- Climbing, Running, and Volley ball