

Curriculum Vitae

Erwann BOCQUILLON

Chargé de Recherche CNRS
Laboratoire de Physique de l'ENS – CNRS UMR 8023
École Normale Supérieure
24 rue Lhomond
75005 PARIS

French
Born on 11/02/1985
Phone : +33 1 44 32 25 46
erwann.bocquillon@ens.fr
ORCID: 0000-0002-5875-1718

Education

- 2008 – 2009 | **Master "Quantum Physics"**
Ecole Normale Supérieure – Paris Sud 11
rank: 3rd, Very good (Summa cum Laude)
- 2007 – 2008 | **Agrégation de Physique**
Préparation à l'Agrégation de Montrouge
National qualification exam for high school teachers, rank: 2nd/~1300
- 2005 – 2009 | **Student at École Normale Supérieure (Paris)**
admitted at BSc level via national entrance exam (option MP), rank:
22nd/40
- 2002 – 2005 | **Classes préparatoires MPSI-MP***
Lycée Faidherbe, Lille

Positions

- Oct. 2016 – | **CNRS Junior Researcher, Laboratoire de Physique de l'ENS, Paris**
formerly Laboratoire Pierre Aigrain, Mesoscopic Physics Group
permanent civil servant position
- 2016 | **CNRS Post-Doctoral Researcher, Laboratoire Pierre Aigrain, Paris**
Mesoscopic Physics Group
3-month contract before hiring as Junior Researcher
- 2013 – 2016 | **Post-doc, University of Würzburg**
Chair of L. W. Molenkamp
Superconducting nanostructures on topological insulators
Fellowship from the A. von Humboldt foundation (2 years)
- 2009 – 2012 | **Agrégé-Préparateur, École Normale Supérieure (Paris)**
Teaching assistant with full teaching duty (192 hr/yr)

Scientific stays

- Apr. 2015 | Research stay with R.S. Deacon, group of K. Ishibaji
RIKEN, Japan (3 weeks)
- Mar. 2014 | Research stay with R.S. Deacon, groups of K. Ishibaji & S. Tarucha
RIKEN, Japan, DFG-JST program "Topological Electronics" (4 weeks)

Grants and Awards

2018 - 2023	ERC Starting Grant – Project CASTLES
2018 - 2020	"Mi-Lourds" Investment project (SIRTEQ, Région Ile de France)
2017	Nicholas Kurti Science Prize for Europe
2013 - 2015	Post-doctoral Fellow of the Humboldt Foundation

Teaching and supervision experience

Please see more in the "List of given courses".

- Invited lecturer in several local or international winter/summer schools: Mauterndorf 2020, Topological Matter 2017 & 2018, Summer Academy 2018 of SFB1277, Elitenetzwerk Bayern Winter School 2019
- Large teaching experience as lecturer and teaching assistant at BSc and MSc level
 - Teaching in English and French
 - Tutorials, Lectures, Labs
- Member of the committee, Entrance competitive exams to ENS
- Supervision of 3 Master students, co-supervision of 1 PhD student (in France), supervision of 2 Bachelor students, 3 Master students, co-supervision of 3 PhD students (in Germany)

Collective responsibilities

2020 -	Elected member of the council of ENS Physics Department
2019 -	Elected member of the council of LPENS
2019 -	Co-organization of the LPENS seminar "Quantum Materials and Devices"
2018	Local organization committee member for "International Conference On Quantum Computing" Paris
2016	Regular referee for Agence Nationale pour la Recherche, Nature Nanotechnology, Nature Comms, PRL, PRB...
2010-2012	Elected member of the council of Laboratoire Pierre Aigrain Organization of the "Students seminar"

Major Collaborations

- Groups of **T. Martin** (University of Marseille, France) and **M. Büttiker** (University of Geneva, Switzerland), on electron quantum optics in quantum Hall edge channels
- Group of **P. Degiovanni** (École Normale Supérieure Lyon, France), collaboration on the topic of electron quantum optics in quantum Hall edge channels and interactions in chiral Luttinger liquids
- **T.M. Klapwijk** (Delft University of Technology, The Netherlands), **S. Tarucha**, **K. Ishibashi** and **R.S. Deacon** (RIKEN, Japan) on the study of induced superconductivity in topological insulators.

- Group of **L.W. Molenkamp** (University of Würzburg, Germany). Since I left Würzburg at the end of June 2016, I have been involved in a collaboration between the Molenkamp group supplying samples and expertise on HgTe-based topological insulators, and my current group in Paris.
- **D. Carpentier** (École Normale Supérieure Lyon, France), **M.-O. Goerbig**, **S. Tchoumakov** (University Paris-Sud) on the topic of topological/trivial heterojunctions
- **B. Trauzettel**, **R. Thomale**, **O. Kashuba**, **T. Müller** (University of Würzburg), on the topic of helical Luttinger liquids.

Publications and scientific communications

Summary

- 32 published articles: 2 invited reviews in *Annalen der Physik* and *Physica Status Solidi B*, 1 *Science*, 2 *Nature Nanotechnology* (including one *News & Views*), 5 *Nature Communications*, 3 *Physical Review Letters*, 1 *Physical Review X*, 8 *Physical Review B*, 1 *Physical Review A*, 1 *Physical Review Applied*, 1 *NanoLetters*, 1 *New Journal of Physics*, 1 *Journal of Physics B*, 1 *Physica Scripta*, 1 *Applied Science*
- First author of a book chapter "Topological Matter", *Springer Series in Solid-State Sciences*
- $h=15$, with ~ 1300 citations (*Web of Science*), more than 230 citations/year since 2017 and 5 articles cited >100 times
- 14 seminars in France and abroad
- 26 oral presentations in conferences and workshops (including 14 upon invitation)

Most important publications

The reference items refer to the number in the "List of publications".

1. M.C. Dartiailh, S. Hartinger, A. Gourmelon, K. Bendias, H. Bartolomei, H. Kamata, J.-M. Berroir, G. Feve, B. Plaçais, L. Lunczer, R. Schlereth, H. Buhmann, L.W Molenkamp, and E. Bocquillon. Dynamical Separation of Bulk and Edge Transport in HgTe-Based 2D Topological Insulators. *Physical Review Letters*, page 6, 2020

This article, recently published, summarizes my first work as a PI. Indeed, following my appointment at CNRS in October 2016, I initiated a new project on the dynamics of topological edge states in HgTe topological insulators. It has been funded by an ERC Starting Grant (project CASTLES), as well as an investment grant from the regional fund DIM SIRTEQ. The launch of this new activity has required important efforts to prepare new experimental setups and develop lithography processes on HgTe.

20. E. Bocquillon, R.S. Deacon, J. Wiedenmann, P. Leubner, T. M. Klapwijk, C. Brüne, K. Ishibashi, H. Buhmann, and L. W. Molenkamp. Gapless Andreev bound states in the quantum spin Hall insulator HgTe. *Nature Nanotechnology*, 12(2):137–143, August 2016

21. J. Wiedenmann, E. Bocquillon, R. S. Deacon, S. Hartinger, O. Herrmann, T. M. Klapwijk, L. Maier, C. Ames, C. Brüne, C. Gould, A. Otwa, K. Ishibashi, S. Tarucha, H. Buhmann, and L. W. Molenkamp. 4π -periodic Josephson supercurrent in HgTe-based topological Josephson junctions. *Nature Communications*, 7:10303, January 2016

During my post-doctoral research stay in the group of L.W. Molenkamp in Würzburg (Germany), I led the activities on the coupling of topological insulators to superconductors. We have in particular identified the fractional Josephson effect in HgTe-based Josephson junctions, a strong signature of topological superconductivity. I believe this set of works has had a pioneering, durable and strong impact on the community, inspired new experimental and theoretical works on topological superconductivity, for example in other topological phases (>400 citations).

25. E. Bocquillon, V. Freulon, J.-M. Berroir, P. Degiovanni, B. Plaçais, A. Cavanna, Y. Jin, and G. Fève. Separation of neutral and charge modes in one dimensional chiral edge channels. *Nature Communications*, 4(1), December 2013
26. E. Bocquillon, V. Freulon, J.-M. Berroir, P. Degiovanni, B. Plaçais, A. Cavanna, Y. Jin, and G. Fève. Coherence and Indistinguishability of Single Electrons Emitted by Independent Sources. *Science*, 339(6123):1054–1057, March 2013

The elementary control of a single quasiparticle has largely expanded the state-of-the-art "electron optics" experiments in electronic Mach-Zehnder interferometers, by enabling the coherent emission, manipulation and characterization of single electron wavepackets. We demonstrated the coherence and indistinguishability of independent electron wavepackets, a resource for quantum information in condensed matter systems. More generally, these experiments largely contributed to the opening of the new field of "electron quantum optics" in what was originally a niche activity in condensed matter physics (>700 citations).