

# Rubén Seoane Souto

PERSONAL INFORMATION	<p>Sor Juana Inés de la Cruz 3 Madrid, Spain 28049 Website: <a href="https://rubenseoanes.github.io/">https://rubenseoanes.github.io/</a> ORCID: 0000-0002-2978-3534</p>	<p>+34 913336875 <a href="mailto:ruben.seoane@csic.se">ruben.seoane@csic.se</a> Researcher ID: N-8483-2016</p>
ACADEMIC POSITIONS	<p><b>Group leader – CAM talento fellow</b> Materials Science Institute of Madrid (ICMM) , Spanish Research Council (CSIC)</p> <p><b>Marie Curie research fellow</b> Department of theoretical condensed matter physics, Universidad Autónoma de Madrid</p> <p><b>Postdoctoral researcher</b> Center for Quantum Devices, Niels Bohr Institute University of Copenhagen</p> <p><b>Researcher</b> Solid state division and Nanolund, Lund university, Visiting researcher at Center for Quantum Devices University of Copenhagen</p> <p><b>Posdoctoral researcher</b> Solid state division and Nanolund, Lund university, Visiting researcher at Center for Quantum Devices University of Copenhagen</p> <p><b>Adjunct professor</b> (during the Ph.D. studies) Department of theoretical condensed matter physics, Universidad Autónoma de Madrid</p> <p><b>Doctoral student</b> Department of theoretical condensed matter physics, Condensed matter Physics center (IFIMAC) Universidad Autónoma de Madrid Supervisors: Prof. Alfredo Levy Yeyati and Prof. Álvaro Martín-Rodero</p>	<p>4/2023 to present</p> <p>1/2023 to 3/2023</p> <p>11/2022 to 12/2022</p> <p>11/2020 to 10/2022</p> <p>11/2018 to 10/2020</p> <p>10/2016-10/2018</p> <p>1/2013-10/2016</p>
RESEARCH VISITS	<p><b>Laboratoire Ondes et Matière d’Aquitaine</b>, CNRS Université de Bordeaux Supervisor: Dr. Rémi Avriller</p>	<p>4/2016-7/2016</p>
EDUCATION	<p><b>Universidad Autónoma de Madrid</b>, Madrid, Spain</p> <p>Ph.D., <b>Condensed matter physics, nanophysics and biophysics</b>, Thesis title: <i>Quench dynamics in interacting and superconducting nanojunctions</i>. Supervisors: Prof. Alfredo Levy Yeyati and Prof. Álvaro Martín Rodero</p> <p>Master’s degree, <b>Master in condensed matter physics and nanotechnology</b>, Master thesis: <i>Electronic transport through molecular transistors in the polaronic regime</i> Supervisors: Prof. Alfredo Levy Yeyati, Prof. Álvaro Martín Rodero and Prof. Rosa C. Monreal</p> <p><b>Universidad Complutense de Madrid</b>, Madrid, Spain</p> <p>Extended Bachelor in Physics (5 years degree),</p> <ul style="list-style-type: none"><li>Undergraduate thesis: <i>Strong coupling correlation functions and semiclassical strings</i></li><li>Supervisor: <b>Rafael Hernández Redondo, Ph.D.</b></li><li>Topic: String theory</li></ul>	<p>15/6/2018</p> <p>7/2013</p> <p>7/2012</p>

- Quantum transport
- Topological states of matter
- Mesoscopic superconductivity
- Quantum technologies

Articles as first author or equal contribution to first are **highlighted** in yellow, and articles as corresponding author appear with \*.

1. M. Alvarado, A. Levy Yeyati, R. Aguado, and **R. Seoane Souto**. *Interplay between Majorana and Shiba states in a minimal Kitaev chain coupled to a superconductor*. *Phys. Rev. B* **110**, 245144 (2024).
2. I. Sardinero, **R. Seoane Souto**, and P. Burset. *Topological superconductivity in a magnetic-texture coupled Josephson junction*. *Phys. Rev. B* **110**, L060505 (2024).
3. J. Benestad, A. Tsintzis, **R. Seoane Souto**, M. Leijnse, E. van Nieuwenburg, and J. Danon. *Machine-learned tuning of artificial Kitaev chains from tunneling-spectroscopy measurements*. *Phys. Rev. B* **110**, 075402 (2024).
4. M. Geier, **R. Seoane Souto**, J. Schulenburg, S. Asaad, M. Leijnse, and K. Flensberg. *A fermion-parity qubit in a proximitized double quantum dot*. *Phys. Rev. Research* **6**, 023281 (2024).
5. **R. Seoane Souto**\*, D. Kuzmanovski, I. Sardinero, P. Burset, and A. V. Balatsky. *P-wave pairing near a spin-split Josephson junction*. *J. Low Temp. Phys.* **217**, 106–120 (2024).
6. **R. Seoane Souto**\*, M. Leijnse, C. Schrade, M. Valentini, G. Katsaros, and J. Danon. *Tuning the Josephson diode response with an ac current*. *Phys. Rev. Research* **6**, L022002 (2024).
7. M. Nitsch, **R. Seoane Souto**, S. Matern, and M. Leijnse. *Transport-based fusion that distinguishes between Majorana and Andreev bound states*. *Phys. Rev. B* **109**, 165404 (2024).
8. A. Tsintzis, **R. Seoane Souto**, K. Flensberg, J. Danon, and M. Leijnse. *Roadmap towards Majorana qubits and nonabelian physics in quantum dot-based minimal Kitaev chains*. *Phys. Rev. X Quantum* **5**, 010323 (2024).
9. D. M. Pino, **R. Seoane Souto**, and R. Aguado. *Minimal Kitaev-transmon qubit based on double quantum dots*. *Phys. Rev. B* **109**, 075101 (2024).
10. D. Razmadze, **R. Seoane Souto**, E. C. T. O’Farrell, P. Krogstrup, M. Leijnse, C. M. Marcus, and S. Vaitiekenas. *Supercurrent transport through 1e-periodic full-shell Coulomb islands*. *Phys. Rev. B* **107**, L081301 (2024).
11. M. Valentini, O. Sagi, L. Baghumyan, T. de Gijzel, J. Jung, S. Calcaterra, A. Ballabio, J. Aguilera Servin, K. Aggarwal, M. Janik, T. Adletzberger, **R. Seoane Souto**, M. Leijnse, J. Danon, C. Schrade, E. Bakkers, D. Chrastina, G. Isella, G. Katsaros. *Parity-conserving Cooper-pair transport and ideal superconducting diode in planar Germanium*. *Nature Commun.* **15**, 169 (2024).
12. **R. Seoane Souto**\*, A. Tsintzis, M. Leijnse, and J. Danon. *Probing Majorana localization in minimal Kitaev chains through a quantum dot*. *Phys. Rev. Research* **5**, 043182 (2023).
13. R. Debbarma, A. Tsintzis, M. Aspegren, **R. Seoane Souto**, S. Lehmann, K. Dick, M. Leijnse, and C. Thelander, *Josephson junction  $\pi$ -0 transition induced by orbital hybridization in a double quantum dot*. *Phys. Rev. Lett.* **131**, 256001 (2023).
14. S. Chakraborty, D. Nikolić, **R. Seoane Souto**, W. Belzig, and J. C. Cuevas. *DC Josephson effect between two Yu-Shiba-Rusinov bound states*. *Phys. Rev. B* **108**, 094518 (2023).

15. A. Maiani, K. Flensberg, M. Leijnse, C. Schrade, S. Vaitiekėnas, and **R. Seoane Souto**\*. *Nonsinusoidal current-phase relations in semiconductor-superconductor-ferromagnetic insulator devices*. *Phys. Rev. B* **107**, 245415 (2023).
16. D. Razmadze, **R. Seoane Souto**, L. Galletti, A. Maiani, Y. Liu, P. Krogstrup, C. Schrade, A. Gyenis, C. M. Marcus, and S. Vaitiekėnas. *Supercurrent reversal in ferromagnetic hybrid nanowire Josephson junctions* *Phys. Rev. B* **107**, L081301 (2023). (Equal author contribution with first)
17. **R. Seoane Souto**\*, M. Leijnse, and C. Schrade, *The Josephson diode effect in supercurrent interferometers* *Phys. Rev. Lett.* **129**, 267702 (2022).  
**Selected as best article by GEFES** (Spanish Physical Society)
18. **R. Seoane Souto**\*, M. M. Wauters, K. Flensberg, M. Leijnse, and M. Burrello, *Multiterminal transport spectroscopy of subgap states in Coulomb-blockaded superconductors* *Phys. Rev. B* **106**, 235425 (2022).
19. A. Tsintzis, **R. Seoane Souto**, and M. Leijnse. *Creating and detecting poor man's Majorana bound states in interacting quantum dots*. *Phys. Rev. B* **106**, L201404 (2022)
20. M. Nitsch, **R. Seoane Souto**, and M. Leijnse. *Interference and parity blockade in transport through a Majorana box*. *Phys. Rev. B* **106**, L201305 (2022)
21. S. D. Escribano, A. Maiani, M. Leijnse, K. Flensberg, Y. Oreg, A. Levy Yeyati, E. Prada, and **R. Seoane Souto**\*. *Semiconductor-ferromagnet-superconductor planar heterostructures for 1D topological superconductivity*. *NPJ Quantum Mater.* **7**, 81 (2022)
22. **R. Seoane Souto**\* and M. Leijnse. *Fusion rules in a Majorana single-charge transistor*. *SciPost Phys.* **12**, 161 (2022)
23. S. Krøjer, **R. Seoane Souto**\*, and K. Flensberg. *Demonstrating Majorana nonabelian exchange using fast adiabatic charge-transfer*. *Phys. Rev. B* **105**, 045425 (2022)
24. S. Vaitiekėnas, **R. Seoane Souto**, Y. Liu, P. Krogstrup, K. Flensberg, M. Leijnse, C. M. Marcus. *Evidence for spin-polarized bound states in semiconductor-superconductor-ferromagnetic-insulator islands*. *Phys. Rev. B* **105**, L041304 (2022)
25. **R. Seoane Souto**\*, A. E. Feiguin, A. Martín-Rodero, and A. Levy Yeyati. *Transient dynamics of a magnetic impurity coupled to superconducting electrodes: exact numerics versus perturbation theory*. *Phys. Rev. B* **104**, 214506 (2021)
26. D. Kuzmanovski , **R. Seoane Souto**, and A. V. Balatsky. *Persistent current noise in narrow Josephson junctions*. *Phys. Rev. B* **104**, L100505 (2021)
27. A. Maiani, **R. Seoane Souto**\*, M. Leijnse, and K. Flensberg. *Topological superconductivity in semiconductor-superconductor-magnetic insulator heterostructures*. *Phys. Rev. B* **103**, 104508 (2021)
28. **R. Seoane Souto**\*, D. Kuzmanovski, and A. V. Balatsky. *Signatures of odd-frequency pairing in the Josephson junction current noise*. *Phys. Rev. Research* **2**, 043193 (2020)
29. D. Kuzmanovski, **R. Seoane Souto**, and A. V. Balatsky. *Odd-frequency superconductivity near a magnetic impurity in a conventional superconductor*. *Phys. Rev. B* **101**, 094505 (2020)
30. **R. Seoane Souto**\*, K. Flensberg, and M. Leijnse. *Timescales for charge transfer based operations on Majorana systems*. *Phys. Rev. B* **101**, 081407 (Rapid communication) (2020)
31. R. Avriller, **R. Seoane Souto**, A. Martín-Rodero, and A. Levy Yeyati. *Build-up of Vibron-Mediated Electron Correlations in Molecular Junctions*. *Phys. Rev. B* **99**, 121403 (Rapid communication) (2019)
32. **R. Seoane Souto**\*, R. Avriller, A. Levy Yeyati, and A. Martín-Rodero. *Transient dynamics in interacting nanojunctions within self-consistent perturbation theory*. *New J. Phys.* **20**, 083039 (2018)

33. **R. Seoane Souto**, A. Martín-Rodero, and A. Levy Yeyati. *Quench dynamics in superconducting nanojunctions: Metastability and dynamical Yang-Lee zeros*. *Phys. Rev. B* **96**, 165444 (2017)
34. **R. Seoane Souto**<sup>\*</sup>, A. Martín-Rodero, and A. Levy Yeyati. *Analysis of universality in transient dynamics of coherent electronic transport*. *Fortschr. Phys.* **65**, 1600062 (2017)
35. **R. Seoane Souto**<sup>\*</sup>, A. Martín-Rodero, and A. Levy Yeyati. *Andreev Bound States Formation and Quasiparticle Trapping in Quench Dynamics Revealed by Time-Dependent Counting Statistics*. *Phys. Rev. Lett.* **117**, 267701 (2016)
36. **R. Seoane Souto**, R. Avriller, R. C. Monreal, A. Martín-Rodero, and A. Levy Yeyati. *Transient dynamics and waiting time distribution of molecular junctions in the polaronic regime*. *Phys. Rev. B* **92**, 125435 (2015)
37. **R. Seoane Souto**, A. Levy Yeyati, A. Martín-Rodero, R. C. Monreal, *Dressed tunneling approximation for electronic transport through molecular transistors*. *Phys. Rev. B* **89**, 085412 (2014)

#### PREPRINTS

1. M. Nitsch, L. Maffi, V. V. Baran, **R. Seoane Souto**, J. Paaske, M. Leijnse, and M. Burrello. *The poor man's Majorana tetron*. [arXiv:2411.11981](#) (2024).
2. **R. Seoane Souto**<sup>\*</sup>, V. V. Baran, M. Nitsch, L. Maffi, J. Paaske, M. Leijnse, and M. Burrello. *Majorana modes in quantum dots coupled via a floating superconducting island*. [arXiv:2411.07068](#) (2024).
3. D. Scheer, **R. Seoane Souto**, F. Hassler, and J. Danon. *Tunable diode effect in a superconducting tunnel junction with biharmonic drive*. [arXiv:2410.03433](#) (2024).
4. A. Maiani and **R. Seoane Souto**. *Impurity States in Altermagnetic Superconductors*. [arXiv:2409.01008](#) (2024).
5. M. Valentini, **R. Seoane Souto**, M. Borovkov, P. Krogstrup, Y. Meir, Martin Leijnse, J. Danon, and G Katsaros. *Subgap-state-mediated transport in superconductor-semiconductor hybrid islands: Weak and strong coupling regimes*. [arXiv:2407.05195](#) (2024).
6. A. Maiani, A. C. C. Drachmann, L. Galletti, C. Schrade, Y. Liu, **R. Seoane Souto**, and S. Vaitiekėnas. *Percolative supercurrent in superconductor-ferromagnetic insulator bilayers*. [arXiv:2404.17320](#) (2024).
7. D. Kuzmanovski, **R. Seoane Souto**, P. J. Wong, and A. V. Balatsky. *Mobile Topological Su-Schrieffer-Heeger Soliton in a Josephson Metamaterial*. [arXiv:2312.03456](#) (2023).

#### REFeree ACTIVITIES

Regular referee of journals of the American Physical Society, including Physical Review Letters, Physical Review B and Physical Review Research. Referee Springer Nature journals, including Nature, Nature Physics, Communications Physics, and Scientific Reports.

#### MONOGRAPHS

*Quench dynamics in interacting and superconducting nanojunctions*. 2020  
Springer Thesis series recognizing outstanding Ph.D. research. ISBN: 978-3-030-36594-3

#### BOOK CHAPTERS

*Subgap states in semiconductor-superconductor devices for quantum technologies: Andreev qubits and minimal Majorana chains*. 2024  
**R. Seoane Souto** and R. Aguado  
In, *New Trends and Platforms for Quantum Technologies*. editors. R. Aguado, R. Citro, M. Lewenstein, and M. Stern. Lecture Notes in Physics, vol. 1025. Springer, Cham. [[arXiv:2404.06592](#) (2024)].

#### PATENTS

Improved plano-convex lens projector, [ES2570808B1](#) 5/2016  
Participation on the invention and design: 50%

GRANTS AND  
FELLOWSHIPS

**Fellowships**

- *Nanoscale superconductors meet quantum technologies* 04/2023 - 03/2028  
Comunidad de Madrid Talento program. Budget 475,000 €  
Including 200 k€ to begin my own group
- *Dynamics, transport, and non-local properties of topological superconductors* 01/2023 - 01/2025  
Marie Skłodowska-Curie Grant Agreement No. 10103324: Budget 125,192 €  
Top 2% applicant.
- *Dynamics, transport, and non-local properties of topological superconductors* 01/2023 - 01/2026  
Vieira y Clavijo Junior fellowship: Budget 112,828 €  
(Resigned due to incompatibility with other fellowships.)

**Grants as principal investigator**

- *Nanoscale superconductors meet quantum technologies* 1/2023 - 12/2025  
Spanish Research Agency: Budget 37,500 €
- *Andreev bound states in the continuum* 1/2022 - 12/2022  
Nanolund seedling project: Budget 100,000 SEK (9,693 €)
- *Transport signatures of odd-frequency superconductivity in nanostructures* 1/2020 - 12/2020  
Nanolund seedling project: Budget 100,000 SEK (9,693 €)

**Student grants**

- Predoctoral grant from the national research agency 1/2013 - 10/2016  
21,500€ per year, including tuition fee (total 92,750 €)  
Department of theoretical condensed matter physics  
Universidad Autónoma de Madrid  
Supervisors: Prof. Alfredo Levy Yeyati and Prof. Álvaro Martín-Rodero
- M.Sc. studentship (4,000 €) 1/2013 - 10/2016  
Master's degree in condensed matter physics and nanotechnology  
Universidad Autónoma de Madrid
- Summer research fellowship from the Ignacio Cirac program chair (2700€) 7/2012 - 9/2012  
Quantum photonics with solids and atoms group  
Institute of photonic sciences (ICFO)  
Supervisor: Prof. Hugues de Riedmatten
- Spanish undergraduate research fellowship (2,700 €) 1/2012 - 7/2012  
Theoretical physics department II, Universidad Complutense de Madrid  
Supervisor: Dr. Rafael Hernández Redondo

**Travel grants**

- Lindau Nobel Laureate meeting, Lindau (Germany).  
Granted by Ragnar Söderberg and Lindau Nobel Laureate Meeting foundations, 5,500 €
- Workshop in bound states in superconductors and interfaces, Dresden (Germany)  
Granted by Lunds Tekniska Högskola, 8,664 SEK (861 €)
- International school and symposium on nanoscale transport and photonics.  
Granted by Nippon Telegraph and Telephone Corporation, 2600 €

**Access to high-performance computational facilities** granted by the Spanish supercomputing network

- *Coherent control of Andreev bound states in superconducting quantum dots* 11/2016 - 4/2017  
Estimated cost: 2,571.75 €  
Responsible of the project proposal, intermediate reports and justification.
- *Transient transport properties of superconducting quantum dots* 11/2015 - 11/2016  
Estimated cost: 4,572.00 €  
Responsible of the project proposal, intermediate reports and justification.
- *Theoretical study of Majorana single-charge transistor using numerical renormalization group* 7/2015 - 11/2015  
Estimated cost: 3,817.62 €  
Responsible of the project proposal, intermediate reports and justification.

PARTICIPATION IN  
FUNDED  
PROJECTS

- *Foundations of nonlocal and nonabelian condensed-matter systems.* 11/2020 to present  
Coordinator: Prof. Karsten Flensberg. P.I. at Lund university: Prof. Martin Leijnse

ERC Synergy grant. Budget: 9,975,273 €

*2D hybrid materials as a platform for topological quantum computing.* 11/2018 to 10/2020

Coordinator: Prof. Klaus Ensslin. P.I. at Lund university: Prof. Martin Leijnse

Quanterra project. Budget: 1,047,258 €

*Dynamics, superconductivity and topology in hybrid nanostructures.* 1/2017 - 10/2018

Principal investigator: Prof. Alfredo Levy Yeyati.

Granted by MINECO, FIS2017-84860-R. Budget: 157,300 €

*Interactions, topology and non-stationary effects in quantum transport.* 1/2014 - 1/2018

Principal investigator: Prof. Alfredo Levy Yeyati.

Granted by MINECO, FIS2014-55486-P. Budget: 48,400 €

*Correlated electrons in hybrid nanostructures: from transport properties to quantum information processing.* 12/2013 - 12/2014

Principal investigator: Prof. Alfredo Levy Yeyati.

Granted by MINECO, FIS2011-26516. Budget: 47,000 €

#### AWARDS AND DISTINCTIONS

- Best article award for *The Josephson diode effect in supercurrent interferometers*, **Phys. Rev. Lett.** **129**, 267702 (2022). 6/2023  
Awarded by GEFES (Spanish Physical Society)
- Junior Scientist Ideas Award 3/2022  
Awarded by Nanolund
- Seal of Excellence Certificate delivered by the European Commission 3/2021  
For the project proposal: *Simulating transport and dynamics of non-local and non-abelian quasiparticles* (STONNES)  
Horizon 2020's Marie Skłodowska-Curie actions call H2020-MSCA-IF-2020.
- Best question award 12/2020  
SPICE-Workshop Coherent order and transport in spin-active systems. Cash prize 50 €.
- Junior Scientist Ideas Award 4/2020  
Awarded by Nanolund
- Seal of Excellence Certificate delivered by the European Commission 3/2020  
For the project proposal: *Dynamical aspects of Majorana fermions out-of-equilibrium: non-local properties and quantum operations* (DYNAMO)  
Horizon 2020's Marie Skłodowska-Curie actions call H2020-MSCA-IF-2019.
- Springer Thesis award for outstanding Ph.D. research 8/2019  
Invitation to publish doctoral thesis in Springer Theses series. Cash prize 500 €.

#### Student awards

- Young researcher 1<sup>st</sup> prize in material science 12/2017  
Awarded by Instituto Nicolás Cabrera. Cash prize 400 €.
- Best student poster award 8/2016  
Awarded by the International Union of pure and applied Physics.  
33rd international conference on the physics of semiconductors, Beijing.  
Cash prize 2,500 ¥.
- Young researcher 2<sup>nd</sup> prize in material science 12/2015  
Awarded by Instituto Nicolás Cabrera. Cash prize 100 €.

#### SUPERVISION EXPERIENCE

##### Postdoctoral researchers

- Miguel Alvarado since 2024  
Materials Science Institute of Madrid (ICMM-CSIC)  
Co-supervised with R. Aguado

##### PhD thesis

- José Luis del Olmo, PhD thesis on superconducting devices since 2024  
Materials Science Institute of Madrid (ICMM-CSIC)  
Co-directed with R. Aguado

##### Master theses direction



- Nicolás Martínez-Valero, master thesis on artificial Kitaev chains 2024  
Materials Science Institute of Madrid (ICMM-CSIC)
- Jakob Westerberg, *Theory of Time-Dependent Transport and Levitons in Nanowires* 23/4/2021  
Solid State Division, Lund University  
Co-directed with M. Leijnse
- Svend K. Møller, *Detecting Majorana Bound States.* 27/8/2020  
Center for Quantum Devices, Copenhagen University  
Co-directed with K. Flensberg

#### Bachelor theses direction

- Adrien Delpoux, *Tight-Binding models of Nanowires.* 4/6/2020  
Université Toulouse III, Paul Sabatier  
Co-directed with A. Tsintzis and M. Leijnse

#### TEACHING EXPERIENCE

Lund university.

- Theory of superconductivity, course for Ph.D. students. 6/12/2019  
Guest lecture on topological superconductivity and Majorana fermions.

Universidad Autónoma de Madrid. Average evaluation 4.5/5 in internal performance assessments

- Experimental Techniques: Optics and Thermodynamics. Courses: 2016-2018  
Third year course of the physics degree.  
Responsible of the weekly practices, holding office hours and grading reports.
- Physics I. Courses: 2015-2018  
Introductory Physics course for chemical engineers: Mechanics and thermodynamics  
Responsible of the weekly homework sessions, holding office hours and grading problem sets.
- Laboratory of general physics. Courses: 2014-2017  
Introductory Physics course, chemical degree.  
Responsible of the weekly practices, holding office hours and grading reports.

#### PRESENTATIONS **Invited speaker**

1. *Majorana states in minimal Kitaev chains.* 4/12/2024  
JYU Quantum electronics, superconductivity, and topology workshop. Jyväskylä (Finland)
2. *Minimal Kitaev chains: toward braiding and fusion.* 22/5/2024  
Quantum matter for quantum Technologies. Ingelheim (Germany)
3. *Majorana Qubits and Non-Abelian Physics in Minimal Kitaev Chains.* 12/3/2024  
Workshop on Superconductor-Semiconductor Hybrids. Copenhagen (Denmark)
4. *Tunable supercurrent diode effect in interferometers.* 20/6/2023  
NanoSeries2023. Madrid (Spain)
5. *Superconductor-semiconductor hybrid devices for quantum science and technology* 20/3/2023  
International meeting on superconducting quantum materials and nanodevices. Budba (Montenegro)
6. *Superconductor-semiconductor hybrid devices for quantum science and technology* 18/11/2022  
Modern Aspects in Quantum Materials and Quantum Technology. Greifswald (Germany)
7. *Magnetism and spin-polarized bound states in semiconductor-superconductor-ferromagnetic wires* 14/10/2022  
Northern Lights conference: Magnetism, Topology, and Superconductivity. Reykjavik (Iceland)
8. *Super-semi-ferro as a new platform for quantum technologies* 11/10/2022  
Nanolund annual meeting. Lund (Sweden)
9. *Spin-polarized bound states in semiconductor-superconductor-ferromagnetic platforms* 18/1/2022  
Young investigators online workshop on unconventional superconductivity. online
10. *Time scales for charge-transfer based operations on Majorana systems* 9/9/2019  
Q Rob workshop. Microsoft, Redmond (USA)

## Oral presentations

1. *Toward braiding and fusion with Poor man's Majorana states.* 19/12/2024  
Progress on Realization of Topological States of Matter. Honolulu (USA)
2. *Minimal Kitaev chains: toward braiding and fusion.* 3/6/2024  
Quantum matter working group meeting (Nordita). Stockholm (Sweden)
3. *Poor man's Majorana states in quantum dot systems.* 12/6/2023  
Bound states in superconducting devices. Budapest (Hungary)
4. *Fine-tuned Majorana states in quantum dot systems.* 25/5/2023  
Quantum Matter International Conference. Madrid (Spain)
5. *Andreev bound states in the continuum* 11/10/2022  
Nanolund annual meeting. Lund (Sweden)
6. *Magnetism and spin-polarized bound states in superconductor-ferromagnetic wires* 22/8/2022  
29th Meeting of the European Physical society, condensed matter division. Manchester (UK)
7. *Majorana fusion rules in a single-charge topological transistor* 15/3/2022  
APS March meeting Chicago (USA)
8. *Charge-transfer based operations on Majorana systems* 15/12/2021  
722. WE-Heraeus-Seminar Online
9. *Charge-transfer based operations revealing non-abelian statistics of Majorana states* 15/3/2021  
APS March meeting Online
10. *Odd frequency superconductivity in quantum dot systems.* 28/9/2020  
Nanolund annual meeting Lund (Sweden)
11. *Revealing non-abelian statistics of Majorana states using charge-transfer operations.* 2/9/2020  
Meeting of the European Physical society, condensed matter division, GEFES Online
12. *Time scales for charge-transfer based operations on Majorana systems.* 22/11/2019  
Entangled states of matter, CRC183 Berlin (Germany).
13. *Time scales for charge-transfer based operations on Majorana systems.* 9/9/2019  
Q-Rob workshop at Microsoft headquarters Redmond (USA).
14. *Quench Dynamics in superconducting nanojunctions: metastability and dynamical phase transitions.* 10/4/2019  
Workshop on Bound states in superconductors and interfaces Dresden (Germany)
15. *Quench dynamics in superconducting nanojunctions.* 15/11/2017  
International school and symposium on nanoscale transport and photonics Atsugi (Japan)
16. *Quench dynamics in superconducting nanojunctions: metastability and dynamical Yang-Lee zeros.* 2/8/2017  
Nanophysics, from fundamental to applications: reloaded Quy Nhơn
17. *Quench dynamics and counting statistics in interacting nanojunctions: quasi-particles trapping.* 20/9/2016  
10<sup>th</sup> RES (national supercomputing network) conference León (Spain)
18. *Electronic Time Dependent Counting Statistics in interacting Nanojunctions.* 11/4/2016  
Nonequilibrium condensed matter and biological system Madrid (Spain)
19. *Non-stationary and noise properties of molecular junctions in the polaronic regime.* 19/12/2015  
Nicolás Cabrera Young Research Meeting Miraflores (Spain)

## Poster presentations

1. *The parity qubit in double quantum dots.* 7/05/2024  
Quantum Matter confernece Donostia (Spain)
2. *Magnetism and spin-polarized bound states in semiconductor-superconductor-ferromagnet wires.* 30/05/2022  
Novel Quantum Phases in Superconducting Heterostructures Bad Honnef
3. *Optimal manipulation of Majorana bound states using quantum dots.* 12/1/2021  
Advances in Scalable Hardware Platforms for Quantum Computing Online



4. *Time scales for charge-transfer based operations on Majorana systems.* 6/11/2019  
Quantum life workshop Copenhagen (Denmark).
5. *Time scales of charge transfer based operations of a topological qubit.* 22/7/2019  
Summer School Nanotechnology meets Quantum Information Donostia (Spain).
6. *Quench dynamics in superconducting nanojunctions: Andreev bound states formation and dynamical phase transitions.* 30/6/2019 - 5/7/2019  
Poster displayed during the Lindau Nobel Laureate meeting Lindau (Germany).
7. *Quench dynamics in superconducting nanojunctions.* 25/7/2018  
International Conference on Superlattices, Nanostructures and Nanodevices.
8. *Self-consistent dynamics in interacting nanojunctions: the fate of bistability.* 25/7/2018  
International Conference on Superlattices, Nanostructures and Nanodevices Madrid (Spain)
9. *Transient dynamics and Full Counting statistics in superconducting nanojunctions.* 2/8/2015  
33<sup>rd</sup> International Conference on the Physics of Semiconductors Beijing (China)  
**Best poster award**
10. *Non-stationary transport properties of molecular junctions in the polaronic regime.* 30/7/2015  
Frontiers of Quantum and Mesoscopic Thermodynamics Prague (Czech Republic)
11. *Non-stationary transport properties of molecular junctions in the polaronic regime.* 3/6/2015  
Nano Electromechanical Systems and beyond Bordeaux (France)

## Seminars

1. *Poor man's Majorana in double dots* 20/3/2023  
Nordita, Stockholm (Sweden)
2. *Super-semi-ferro as a platform for quantum science and technology* 7/3/2023  
Autonomous University of Madrid (Spain)
3. *Superconductor-semiconductor hybrids for quantum science and technology* 21/2/2023  
Spanish Research Council (Spain)
4. *Supercurrent reversal in semiconductor-superconductor-ferromagnetic wires* 21/9/2022  
Nordita, Stockholm (Sweden)
5. *Spin-polarized bound states in semiconductor-superconductor-ferromagnetic wires* 20/9/2022  
University of Copenhagen (Denmark)
6. *The Josephson diode effect in supercurrent interferometers* 17/5/2022  
Virtual Science Forum (Online)
7. *Fusion rules in a Majorana single-charge transistor* 13/1/2022  
University of Copenhagen (Denmark)
8. *Quantum transport in topological superconductors: role of non-abelian quasiparticles* 16/6/2021  
Aachen University (Germany)
9. *Dynamics of magnetic impurities coupled to superconductors.* 12/5/2021  
Niels Bohr institute, University of Copenhagen (Denmark)
10. *Spin-polarized bound states in semiconductor-superconductor-ferromagnetic islands* 16/2/2021  
Autonomous University of Madrid (Spain)
11. *Time scales for charge-transfer based operations on Majorana systems* 23/6/2020  
Nordita, Stockholm (Sweden)
12. *Odd-frequency superconductivity close to magnetic impurities* 27/5/2020  
Lund university (Sweden)
13. *Odd-frequency superconductivity close to magnetic impurities* 17/4/2020  
Lund university (Sweden)
14. *Time scales for charge-transfer based operations on Majorana systems* 30/10/2019  
Niels Bohr institute, University of Copenhagen (Denmark).
15. *Quench dynamics in interacting and superconducting nanojunctions* 10/4/2019  
Nordita, Stockholm (Sweden)

16. *Counting statistics reveal quasiparticle trapping in superconducting nanojunctions* 30/1/2019  
Niels Bohr institute, University of Copenhagen (Denmark)
17. *Counting statistics revealing dynamical phase transitions.* 16/11/2018  
Lund university (Sweden)
18. *Quench dynamics in interacting and superconducting nanojunctions* 25/7/2018  
Lund university (Sweden)
19. *Quench dynamics in interacting and superconducting nanojunctions* 9/7/2018  
Würzburg university (Germany)
20. *Counting statistics in superconducting nanojunctions* 13/12/2017  
Autonomous University of Madrid (Spain)
21. *Electronic time dependent counting statistics in interacting nanojunctions* 27/4/2016  
Autonomous University of Madrid (Spain)
22. *Inelastic effects in transport through molecular junctions* 11/3/2015  
Autonomous University of Madrid (Spain)

#### Public engagement in science

- Superconductivity experimental show at the European Researchers night, Madrid (Spain). 27/9/2024
- Superconductivity experimental show at Madrid's Science week, Madrid (Spain). 8/3/2024
- Open session of the CIVIS assembly, hybrid, Marseille (France). 27/1/2023  
Presentation about: *Non-local states for quantum technologies*
- Farad student job fair, Lund (Sweden). 28/1/2020
- Forskar Grand Prix, Helsingborg (Sweden). 26/9/2019  
Short presentation to a young audience of about 200 high school students

#### INTERNATIONAL SCHOOLS

- Nanotechnology meets Quantum Information, San Sebastián. 22-26/7/2019
- Quantum transport in topological materials, Madrid. 4-8/9/2017
- Capri spring school on transport in nanostructures, Capri. 8-12/4/2013