

Jose L. Lado

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CV date: September 12th 2026

Employment

2023–	Assistant Professor level 2 (fixed-term), Department of Applied Physics, Aalto University, Finland
2019–2023	Assistant Professor level 1, Department of Applied Physics, Aalto University, Finland
2017–2019	ETH Postdoctoral Fellow, Institute for Theoretical Physics, ETH Zurich, Switzerland
2016–2017	Research Fellow, International Iberian Nanotechnology Laboratory, Braga, Portugal
2013–2016	Marie Curie-Sklodowska Early Stage Researcher, International Iberian Nanotechnology Laboratory, Braga, Portugal

Education

2013–2016	Ph.D. in Material Science, Department of Applied Physics, University of Santiago de Compostela, Spain. Thesis: “Topological electronic phases in graphene” (supervisor: Joaquín Fernández-Rossier)
2012–2013	Master degree in Material Science and Technology, University of Santiago de Compostela, Spain
2007–2012	Bachelor degree in Physics, University of Santiago de Compostela, Spain

Awards and Honours

2025–2030	European Research Council (ERC) Consolidator Grant (ULTRATWISTROICS)
2024	2DM Young Scientist Award, awarded by IOP
2023	Early Career Theory Award , Royal Spanish Physics Society – BBVA Foundation
2023	EPS Early Career Award , European Physical Society
2021	Early Career Award (runner-up) , DPG & IOP through New Journal of Physics
2020–2025	Academy of Finland Research Fellow
2017–2019	ETH Postdoctoral Fellowship, ETH Zurich, Switzerland
2016	Best Ph.D. Thesis in Theoretical Condensed Matter Physics , Spanish Royal Society of Physics
2016	Extraordinary Doctorate Prize, University of Santiago de Compostela, Spain

Selected Funding

2025–2030	2 000 k€ — ERC Consolidator Grant ULTRATWISTROICS , European Research Council (<i>sole PI</i>)
2020–2025	1 010 k€ — Academy Research Fellow grant , Research Council of Finland (<i>sole PI</i>)
2026–2028	434 k€ — Centre of Excellence in Quantum Materials QMAT , Research Council of Finland, share of the first funding period of a centre running 2026–2033 (<i>one of 8 PIs, vice-director</i>)
2025–2029	407 k€ — Atom-vdW project grant , Research Council of Finland (<i>co-PI</i>)
2021–2023	294 k€ — HEAVYTWIST , Jane and Aatos Erkkö Foundation (<i>sole PI</i>)
2023–2025	150 k€ — QUCOMAT , Jane and Aatos Erkkö Foundation (<i>co-PI</i>)
Total (PI)	4.39 M€ of external competitive funding since 2019. Every amount is my own share, not the total volume of the project.
Internal	1.28 M€ from Aalto University: 150 k€ tenure-track starting package, 200 k€ support grant for highly ranked ERC applicants, 220 k€ QMAT strategic co-funding, 241 k€ doctoral school funding, 173 k€ for two QDOC doctoral positions, and 296 k€ of departmental basic, Flagship co-funding and mobility funding.
Group	1.38 M€ secured by group members in their own name: Research Council of Finland postdoctoral (335 k€) and Research Fellow (1 040 k€) funding to A. Fumega. Further, a Magnus Ehrnrooth post-doctoral grant to F. Aikebaier and a four-year Nokia Industrial Doctoral School position to E. Pereira.

Supervision and Mentoring

Currently supervising 7 Ph.D. students (T. Antão, G. Lupi, A. Vera, Y. Sun, H. Stenbrink, C. Lee, A. Orsini) and 2 postdoctoral researchers and 1 research fellow. Graduated 6 Ph.D. students since 2019 (G. Chen, M. Khosravian, R. Koch, P. Vecsei, M. Niedermeier, F. Nigmatulin), with a seventh (E. Pereira) having submitted the thesis, defence scheduled for October 2026, and supervised 5 postdoctoral researchers, 11 completed M.Sc. theses and 13 completed B.Sc. theses. Mentored a postdoc who secured independent competitive funding (A. Fumega, 330 k€ RCF 2022, 1 M€ 2025) and a B.Sc. student awarded best physics B.Sc. thesis worldwide in 2023 (N. Karjalainen). Published with 213 coauthors (Scopus). Last author on 55 manuscripts since 2019.

Teaching

27 credits of pedagogical training, Aalto University.

- 2025–** Responsible teacher, Advanced Quantum Materials (M.Sc.), Aalto University
- 2024–** Co-responsible teacher, Advanced Computational Methods in Physics (M.Sc.), Aalto University
- 2025** Co-lecturer, “Training Workshop: Modelling Layered Materials”, INL, Portugal
- 2026** Tutorial, “Correlated 2D materials”, Heraeus binational meeting, Nordita, Sweden
- 2020–2024** Responsible teacher, Solid State Physics (M.Sc.), Aalto University
- 2022** Main lecturer, 31st Jyväskylä Summer School: “Emergent quantum matter in artificial 2D materials”
- 2023** Co-lecturer, “Advanced Physics of van der Waals heterostructures”, Roscoff, France
- 2023** Co-lecturer, “Emergent phenomena in van der Waals heterostructures”, TIFR, Mumbai, India
- 2018–2019** Teaching assistant, ETH Zurich (Many-body quantum transport, Physics in the Smartphone, and Quantum field theoretical methods for mesoscopic transport)

Research Output and Open-Source Software

152 peer-reviewed publications (plus 18 preprints and 7 invited perspective articles), including 20 Physical Review Letters, 1 Physical Review X, 3 Nature Nanotechnology, 1 Nature, 1 Nature Physics, 1 Nature Materials, 12 Nano Letters, 5 Advanced Materials, 3 Nature Communications, 2 Science, 2 Science Advances. Cited 7288 times, h-index 39 ([Google Scholar](#), September 2026). Main developer of three widely used open-source packages:

- [pyqula](#) — Python library for tight-binding modeling of quantum materials, used by theoretical groups worldwide and the core software of the 2022 Jyväskylä Summer School.
- [dmrgpy](#) — Python library for many-body quantum lattice models with tensor-network techniques.
- [Quantum Lattice](#) — graphical interface for tight-binding modeling of van der Waals materials, used by experimental groups worldwide.

Research Highlights

- Heavy fermions** First theoretical proposal ([Phys. Rev. Lett. 127, 026401 \(2021\)](#)) and first experimental demonstration ([Nature 599, 582 \(2021\)](#)) of heavy-fermion physics in twisted van der Waals heterostructures, extending heavy-fermion phenomena beyond rare-earth compounds for the first time, later extended to a van der Waals monolayer, CeSiI ([Nano Letters \(2024\)](#)).
- Moiré quantum matter** A sequence of results ([Phys. Rev. Lett. 119, 107201 \(2017\)](#), [123, 096802 \(2019\)](#) and [121, 146801 \(2018\)](#) — PRL cover, APS 2019 calendar) established electrical control of correlated and topological states in twisted graphene multilayers, with the 2018 prediction experimentally confirmed in [Phys. Rev. Lett. 129, 076803 \(2022\)](#). An artificial moiré topological superconductor followed in [Nano Letters 22, 328 \(2022\)](#).
- vdW multiferroics** Established mechanisms for spin-orbit and twist-controlled multiferroicity in van der Waals magnets ([Phys. Rev. Lett. 126, 056803 \(2021\)](#), [Science Advances 6, eabb9379 \(2020\)](#), [2D Materials 9, 025010 \(2022\)](#) and [10, 025026 \(2023\)](#)), later confirmed experimentally in NiI₂ by scanning tunnelling microscopy ([Advanced Materials, 2311342 \(2024\)](#)).
- Tensor-network solvers** Developed tensor-network algorithms that extended many-body and large-scale quantum simulation beyond the reach of conventional methods, from a non-Hermitian kernel polynomial algorithm for dynamical excitations of open quantum many-body systems ([Phys. Rev. Lett. 130, 100401 \(2023\)](#)) to a self-consistent mean-field tensor-network solver for correlated super-moiré matter beyond one billion sites ([Phys. Rev. Research 7, 043288 \(2025\)](#)) and a method for real-space topological invariants in quasicrystals and super-moiré systems with hundreds of millions of sites, several orders of magnitude beyond conventional approaches ([Phys. Rev. Lett. 136, 156601 \(2026\)](#)). The dynamical-excitation algorithms are released in the open-source package [dmrgpy](#).
- Hamiltonian learning** Established machine-learning methods to extract quantum many-body Hamiltonians directly from spectroscopy ([Phys. Rev. Applied 20, 024054 \(2023\)](#)), extended to non-local impurity tomography of quantum magnets ([Phys. Rev. Applied 23, 054077 \(2025\)](#)) and demonstrated on experimental data to reconstruct the triplon excitations of an artificial nanoscale molecular quantum magnet ([Nano Letters 25, 13435 \(2025\)](#)). This line originates in conditional generative adversarial networks trained to reproduce the full dynamical excitation spectra of quantum many-body models, which enable Hamiltonian learning directly from those excitations ([Phys. Rev. Research 4, 033223 \(2022\)](#)).

Selected Publications

As last author

Tensor network method for real-space topology in quasicrystal Chern mosaics

T. V. C. Antão, Y. Sun, A. O. Fumega, J. L. Lado — [Physical Review Letters 136, 156601 \(2026\)](#)

Multicomponent magneto-orbital order and magneto-orbitons in monolayer VCl_3

L. Camerano, A. O. Fumega, G. Profeta, J. L. Lado — [Nano Letters 25, 4825 \(2025\)](#)

Hamiltonian learning of triplon excitations in an artificial nanoscale molecular quantum magnet

R. Koch, R. Drost, P. Liljeroth, J. L. Lado — [Nano Letters 25, 13435 \(2025\)](#)

Nature of the unconventional heavy fermion Kondo state in monolayer $CeSiI$

A. O. Fumega, J. L. Lado — [Nano Letters 24, 4272 \(2024\)](#)

Topological Spin Excitations in Non-Hermitian Spin Chains with a Generalized Kernel Polynomial Algorithm

G. Chen, F. Song, J. L. Lado — [Physical Review Letters 130, 100401 \(2023\)](#)

Moiré-Enabled Topological Superconductivity

S. Kezilebieke, V. Vaño, M. N. Huda, M. Aapro, S. C. Ganguli, P. Liljeroth, J. L. Lado — [Nano Letters 22, 328 \(2022\)](#)

Emulating heavy fermions in twisted trilayer graphene

A. Ramires, J. L. Lado — [Physical Review Letters 127, 026401 \(2021\)](#)

Spontaneous Valley Spirals in Magnetically Encapsulated Twisted Bilayer Graphene

T. M. R. Wolf, O. Zilberberg, G. Blatter, J. L. Lado — [Physical Review Letters 126, 056803 \(2021\)](#)

Interaction driven surface Chern insulator in nodal line semimetals

W. Chen, J. L. Lado — [Physical Review Letters 122, 016803 \(2019\)](#)

Electrically tunable gauge fields in tiny-angle twisted bilayer graphene

A. Ramires, J. L. Lado — [Physical Review Letters 121, 146801 \(2018\)](#)

Selected collaborative publications

Observation of non-Hermitian topology from optical loss modulation

A. Hashemi, E. Louis Pereira, H. Li, J. L. Lado, A. Blanco-Redondo — [Nature Materials 24, 1393 \(2025\)](#)

Artificial heavy fermions in a van der Waals heterostructure

V. Vaño, M. Amini, S. C. Ganguli, G. Chen, J. L. Lado, S. Kezilebieke, P. Liljeroth — [Nature 599, 582 \(2021\)](#)

Probing magnetism in 2D van der Waals crystalline insulators via electron tunneling

D. R. Klein *et al.* — [Science 360, 1218 \(2018\)](#)

Hyperfine interaction of individual atoms on a surface

P. Willke *et al.* — [Science 362, 336 \(2018\)](#)

Electrically controlled nuclear polarization of individual atoms

K. Yang *et al.* — [Nature Nanotechnology 13, 1120 \(2018\)](#)

A kilobyte rewritable atomic memory

F. E. Kalf *et al.* — [Nature Nanotechnology 11, 926 \(2016\)](#)

Full list of 152 peer-reviewed publications: see www.joselado.org or [ORCID](#).

Invited Perspective Articles

Doping a frustrated correlated van der Waals magnet

J. L. Lado — [Nature Materials 23, 1013 \(2024\)](#)

Putting a twist on spintronics

J. L. Lado — [Science 374, 6571 \(2021\)](#)

A layered unconventional superconductor

J. L. Lado, P. Liljeroth — [News & Views, Nature Physics \(2021\)](#)

Invited Talks

62 invited talks at international conferences and workshops since 2014 (59 since 2019), including one representative example per recent year below. Full list: www.joselado.org/talks.

2026	Quantum Materials in and out of Equilibrium – Computational and Experimental Advances , CECAM, Bremen, Germany
2025	Nordic Quantum Information Processing workshop , Nordita, Sweden
2024	JQUEST: JYU Quantum Electronics, Superconductivity, and Topology workshop , Finland
2023	International symposium on Quantum computing for quantum chemistry and quantum materials science , VTT, Finland
2022	ICQMT 2022 , Bodrum, Turkey
2021	Graphene 2021 , Grenoble, France
2020	Coherent order and transport in spin-active systems: interplay between magnetism and superconductivity , SPICE, Germany
2019	Zhejiang Workshop on Correlated Matter , Hangzhou, China

Leadership and Professional Service

Elected member, CMD board, European Physical Society (2023–). Management committee member, COST Action CA21144 (2022–). CECAM Node director, Finland (2020–2024). Quantum Materials Work Package coordinator, Finnish

Quantum Flagship. Leader, ResQ Quantum Materials, Finnish Quantum Institute InstituteQ. Vice-director, [Centre of Excellence in Quantum Materials QMAT](#). Co-Chair, Physics Days 2026, Finnish Physical Society. Early Career Advisor, Physical Review Letters, American Physical Society (2025–).

Meetings Co-Chair, Physics Days 2026, Finland. European School on Superconductivity and Magnetism in Quantum Materials, Spain (2024). CMD31 (2024) and CMD30 (2023) minicolloquia. InstituteQ Annual Symposium (2023). CECAM SMMART Workshop, Aalto (2022). Atomic-scale Quantum Materials colloquium series (2020–2023)

Review Peer reviewer of 143 manuscripts for Science, Nature, Nature Physics, Nature Materials, Nature Communications, Nature Reviews Materials, Physical Review X/Letters/Research, and 2D Materials. External reviewer for FLAG-ERA/Graphene Flagship, Israel Science Foundation, US-Israel BSF, NCN Poland, US DOE, FWF, Swiss NSF, German Research Foundation, and the ERC.

Ph.D. exams External reviewer or opponent in 13 Ph.D. dissertations since 2020, in Spain (4), Switzerland (2), Netherlands (2), Sweden (2), India (2) and Czechia (1).

Additional Information

Languages Spanish (native), English (fluent), Portuguese (intermediate)