

Adrián Franco-Rubio

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CAREER	Max Planck Institute for Quantum Optics , Garching, Germany Postdoctoral Researcher (from September 2020). Humboldt fellow (from September 2021).
EDUCATION	Perimeter Institute for Theoretical Physics & University of Waterloo , Waterloo, Canada Ph.D. Physics, August 2020. <i>Thesis topic:</i> Renormalization, Entanglement and Continuous Tensor Networks, <i>Supervisor:</i> Guifré Vidal M.Sc., Physics, June 2016. <i>Thesis topic:</i> Continuous MERA, <i>Supervisor:</i> Guifré Vidal <i>Graduate level courses:</i> Functional Analysis, General Relativity, Quantum Theory, Quantum Field Theory, Statistical Physics, Condensed Matter, Quantum Many Body Theory, Tensor Networks, Quantum Information, Quantum Foundations, Gravitational Physics, Cosmology, Quantum Gravity, String Theory Universidad de Zaragoza , Zaragoza, Spain B. Sc. Mathematics, July 2016 (GPA 9.92/10). <i>Thesis topic:</i> Holographic Quantum Error Correcting Codes, <i>Supervisor:</i> Daniel Gottesman (Perimeter Institute) B. Sc. Physics, July 2015 (GPA 9.90/10). <i>Thesis topic:</i> Geometrical Formalism of Quantum Mechanics and Decoherence, <i>Supervisors:</i> Jesús Clemente Gallardo and José Cariñena
RESEARCH INTERESTS	Main interests: tensor networks, condensed matter, quantum information, quantum field theory Side interests: mathematical physics (operator algebras, quantum symmetries), mathematics of data science, biophysics
PUBLICATIONS	A.F.R., J. Ignacio Cirac, <i>Gaussian matrix product states cannot efficiently approximate critical systems</i> , 2022. [arXiv:2204.02478] A.F.R., <i>Entanglement renormalization for quantum fields with boundaries and defects</i> , Phys. Rev. B 104, 125131. [arXiv:2103.07463] Q. Hu, A.F.R., G. Vidal, <i>Emergent universality in critical quantum spin chains: entanglement Virasoro algebra</i> , 2020. [arXiv:2009.11383] A.F.R., G. Vidal, <i>Entanglement renormalization for gauge invariant quantum fields</i> , Phys. Rev. D 103, 025013. [arXiv:1910.11815] Q. Hu, A.F.R., G. Vidal, <i>Continuous tensor network renormalization for quantum fields</i> , 2018. [arXiv:1809.05176] A.F.R., G. Vidal, <i>Entanglement and correlations in the continuous multi-scale entanglement renormalization ansatz</i> , J. High Energ. Phys. (2017) 12, 129. [arXiv:1706.02841]
TALKS	Physical Sciences Seminar, Institute for Science and Technology Austria, 2020 Quantum@X seminar, X, the moonshot factory, Mountain View, United States, 2019 (Slides and recordings for some of my talks are available on my website)

Quantum Group seminar, University of Ghent, Belgium, 2019
 QuSoft seminar, University of Amsterdam, The Netherlands, 2019
 Theory Group seminar, Max Planck Institute for Quantum Optics, Germany, 2019
 Conference talk, *Quantum Information and String Theory*, Yukawa Institute, Japan, 2019
 Gravity, Quantum Fields and Information virtual seminar, Albert Einstein Institute Potsdam, 2019
 Short talk, *PI Day*, Perimeter Institute, Canada, 2017
 Conference talk, *Theory Canada 12*, York University, Canada, 2017
 Gong show talk, *It from Qubit Summer School*, Perimeter Institute, Canada, 2016
 Relativistic Quantum Information Group seminar, Institute for Quantum Computing, Canada, 2015

POSTER
 PRESENTATIONS

(Posters available
 on my [website](#))

Quantum Simulation: Gauge fields, holography, topology, University of the Basque Country, Bilbao, Spain, 2019.
Simons Foundation Many Electron Collaboration Annual Meeting, New York, USA, 2019.
Tensor Networks for Quantum Field Theories II, Perimeter Institute, Waterloo, Canada, 2017.

TEACHING
 EXPERIENCE

Max Planck Institute for Quantum Optics, Garching, Germany
 Tutor for an undergraduate summer intern (La Pedrera Foundation), 2021

Perimeter Institute for Theoretical Physics & University of Waterloo, Waterloo, Canada
 Teaching Assistant for PHYS 601 (*Quantum Field Theory I*, PSI Masters Program), 2018
 Teaching Assistant for PHYS 111 (*Physics I*, first-year undergrad mechanics), 2018
 Research Project Assistant for a project on Monte Carlo Techniques, PSI Winter School, 2017

Universidad de Zaragoza, Zaragoza, Spain
 Mathematical Olympiad trainer for high school students at the *Taller de Talento Matemático* (Workshop for Mathematical Talent), 2011-2014

INTERNSHIPS

MultiDark Project one-month internship, ANAIS experiment, Nuclear and Astroparticle Physics Group, Universidad de Zaragoza and Canfranc Underground Laboratory, September 2014

SCHOOLS,
 CONFERENCES AND
 WORKSHOPS
 ATTENDED

Quantum Information Theory Program, Ignacio Cirac Lab, IFT-ICMAT, Madrid, 2019
 Prospects in Theoretical Physics: Great problems in biology for physicists, Institute of Advanced Studies, Princeton, 2019
 Quantum Simulation: gauge fields, holography, topology, University of the Basque Country, 2019
 Quantum Information, Centro de Ciencias de Benasque Pedro Pascual, 2017 and 2019
 CIMPA Research School on Quantum Symmetries, Universidad de los Andes, Bogotá, 2019
 Quantum Information and String Theory 2019, Yukawa Institute for Theoretical Physics, Kyoto
 17th NCGOA Spring Institute “Algebra and Geometry Quantized and Quantified”, Vanderbilt University, 2019
 Quantum Matter: Emergence and Entanglement III, Perimeter Institute, 2019
 Simons Foundation Many Electron Collaboration Annual Meeting, New York, 2019
 International Congress of Mathematical Physics + Young Researchers Symposium, Montréal, 2018
 Summer School on Current Topics in Mathematical Physics, Fields Institute, Toronto, 2018

Gravity: New Perspectives from Strings and Higher Dimensions, Centro de Ciencias de Benasque Pedro Pascual, 2017

Subfactors: Planar algebras, quantum symmetries, and random matrices. Mathematical Sciences Research Institute, Berkeley, 2017

Theory Canada 12, York University, 2016

Tensor Networks for Quantum Field Theories II, Perimeter Institute, 2016

It from Qubit Summer School, Perimeter Institute, 2016

Quantum Groups in Quantum Gravity, Perimeter Institute & University of Waterloo, 2016

Noncommutative Geometry and Physics, Perimeter Institute for Theoretical Physics, 2015

Utrecht Summer School in Theoretical Physics, Universiteit Utrecht, 2014

Summer School in Particle Physics and Astrophysics, Laboratoire d'Annecy de Physique de Particules (LAPP), 2014

HONORS AND AWARDS

Humboldt Research Fellowship, Alexander von Humboldt Foundation, 2021

National Award for Excellence in Academic Performance, Spanish Government, 2020

National Award for Excellence in Academic Performance, Spanish Government, 2018

AGM Award to the Best Academic Record in Science, University of Zaragoza, 2016

Extraordinary Award (Best Academic Record) in Mathematics, University of Zaragoza, 2016

AGM Award to the Best Academic Record in Science, University of Zaragoza, 2015

Extraordinary Award (Best Academic Record) in Physics, University of Zaragoza, 2015

La Caixa Graduate Studies Fellowship (highly competitive graduate scholarship), 2015

Perimeter Scholars International Award, Perimeter Institute, 2015

Excellence Award, University of Zaragoza. Obtained five consecutive years, 2011-2015

5th place, II PLANCKS Physics League, Leiden, The Netherlands. Spanish Team Leader, 2015

Absolute Winner, Barcelona Tech Mathematical Competition for University Students, 2015

Research Collaboration Fellowship, Spanish Ministry of Education, 2014

Two Second Prizes and a Third Prize at the XIX, XX and XXI International Mathematical Competition for University Students, Blagoevgrad, Bulgaria, 2012, 2013, 2014

Two Bronze Medals and a Silver Medal at the XIV, XVI and XVII Ibero-American Mathematical Olympiad, 2011, 2013, 2014

National Baccalaureate Award, Spanish Ministry of Education, 2012

Silver Medal, 42nd International Physics Olympiad (IPhO), Bangkok, Thailand, 2011

Gold Medal (Subchampion), 15th Ibero-American Physics Olympiad Panama, 2010

LANGUAGES

Spanish (native), English (proficient), French (proficient), German (proficient)

COMPUTER SKILLS

Mathematica, Julia (advanced) C, C++, Python, Fortran, Matlab (basic)

TESTS

GRE Physics 990/990 - GRE General Vb. 170/170 Qu. 170/170 An. 4/6 - TOEFL 117/120

- OTHER ACTIVITIES
- Violin studies: Elementary Music Conservatory of Zaragoza (2007-2012) and Professional Music Conservatory of Zaragoza (2012-2015). Perimeter Institute Orchestra member (2015-2020).
 - Student Representative, Theoretical Physics Department Board, Univ. of Zaragoza (2013-2015)
 - Representative of the University of Zaragoza and writer in Matgazine, a mathematical magazine edited by students (2014- 2015).

REFEREES

Dr. Guifré Vidal, X, The Moonshot Factory, guifre@x.team

Dr. Beni Yoshida, Perimeter Institute for Theoretical Physics, byoshida@perimeterinstitute.ca

Dr. Manuel Asorey, University of Zaragoza, asorey@unizar.es

Dr. Jesús Clemente-Gallardo, University of Zaragoza, jesus.clementegallardo@bifi.es

Dr. José Cariñena, University of Zaragoza, jfc@unizar.es