

Luis E. F. Foa Torres

Curriculum Vitae

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Personal Data

Full name as appears on passport: Luis Eduardo Francisco FOA TORRES
Name in scientific publications: Luis E. F. Foa Torres
Place and date of birth: Córdoba (Argentina), April 17th, 1978
Citizenship: Argentina
Marital status: Married to Sandra Elisabeth Rieger, German citizen.



Education and Qualifications

12.1999 *Licenciado en Física* (Master's level in Physics), University of Córdoba (UNC), Argentina. Global point average: 9.17 (scale 1 to 10, ten being the maximum). Master's thesis: "Resonances in Fock Space: Optimization of a Tunnel Device for Ultrasound generation (SASER)."

08.2004 *Doctor en Física* (Ph.D. in Physics), University of Córdoba (UNC), Argentina. Doctoral Thesis: "On the effects of many body interactions and decoherence in the conductance of nano-devices".¹
Advisor: Dr. Horacio M. Pastawski. (finishing date: 11/08/2004)

01.2015 *Investigador Independiente* (Independent Research Scientist) at CONICET.²
The position of *Investigador Independiente* at CONICET is granted after a strict and lengthy evaluation, similar to a habilitation³.

Current Position

05.2016-present **Associate Professor of Physics** (*Profesor Asociado*) at the University of Chile (Santiago, Chile), Department of Physics, Faculty of Physical and Mathematical Sciences (FCFM). Leader of a team of young scientists (physicists and chemists) with a focus on quantum transport, electronic and optoelectronic properties of nanomaterials and nanodevices, mainly graphene and topological insulators.

Previous group leader and visiting positions

01.2015-12.2015 **CONICET Independent Research Scientist.**
(*Investigador Independiente*) Leader of a team at the School of Physics, University of Córdoba.

10.2009-12.2014 **CONICET Adjoint Research Scientist** (*Investigador Adjunto*).
Tenured Researcher, leader of a Junior team at the School of Physics, University of Córdoba (Argentina).

10.2015-12.2015 **Associate Professor at the National University of Córdoba** (UNC, Argentina), School of Physics, Mathematics and Astronomy (FaMAF): Teaching duties at graduate and undergraduate level in Physics and Chemistry.

10.2009-09-2015 **Adjoint Professor at the National University of Córdoba** (UNC, Argentina), School of Physics, Mathematics and Astronomy (FaMAF): Teaching duties at graduate and undergraduate level in Physics and Chemistry.

¹Abstract available at <http://www.foatorres.com/phd-thesis-abstract/>

²CONICET is Argentina's National Council for Science and Technology. It ranks 79th among 4851 world scientific and technical institutions according to the SCImago ranking in 2014 (see <http://bit.ly/ranking-conicet>)

³This includes a stage of anonymous peer review and subsequent analysis by a federal committee which sends a recommendation to the directory board of CONICET who takes the final decision on the promotion.

01.2011-12.2016 **Junior Associate of the Abdus Salam International Centre for Theoretical Physics (ICTP, Trieste, Italy):** Research at ICTP's Condensed Matter Section.

Experience as post-doctoral researcher

March 2008 - September 2009: Awarded as a Humboldt Research Fellow of the *Alexander von Humboldt Foundation* "in recognition to previous research work", Chair for Materials Science and Nanotechnology, Dresden University of Technology (Dresden, Germany).

October 2007 - February 2008: Research Associate at the Chair for Materials Science and Nanotechnology, Dresden University of Technology (Dresden, Germany). Position funded by the EU Project *Cardeq* (Carbon-nanotube devices at the quantum limit).

October 2005 - September 2007: Postdoc at the *Commissariat à l'Energie Atomique*, CEA-Grenoble, Stephan's Roche group (Grenoble, France). Hired within the program *Recherche Technologique de Base* to bridge basic science with technology.

September 2004 - September 2005: Postdoctoral fellow at the *Abdus Salam International Centre for Theoretical Physics*, Trieste, Italy.

Further research experience as visiting researcher

Date	Institution	Place
2015 (11.10 – 25.10)	Karlsruhe Institute of Technology	Karlsruhe, Germany.
2015 (29.01 – 15.03)	The Abdus Salam ICTP	Trieste, Italy.
2014 (09.05 – 14.05)	Centro Atómico Bariloche	Bariloche, Argentina.
2012 (13.07 – 01.09)	The Abdus Salam ICTP	Trieste, Italy.
2012 (01.07 – 13.07)	ICN (Prof. Stephan Roche's group)	Barcelona, Spain.
2007 (16.12 – 19.12)	Helsinki Low Temp. Lab. (Prof. Pertti Hakonen)	Helsinki, Finland.
2005 (22.08 – 24.08)	CEA - Grenoble (Prof. Stephan Roche's group)	Grenoble, France.
2003 (10.08 – 02.10)	"Young Collaborator" at The Abdus Salam ICTP	Trieste, Italy.
2002 (01.06 – 15.06)	UFRJ and CBPF (Prof. C. H. Lewenkopf)	Rio de Janeiro, Brazil.
2001 (01.05 – 15.06)	UFRJ (Prof. C. H. Lewenkopf)	Rio de Janeiro, Brazil.

Awards and honors

Outstanding Referee of the American Physical Society (APS), 2018. Comparable to Fellowship in the APS and other organizations, this is a lifetime award.

Joven Sobresaliente del año 2011, given by Córdoba's Stock Exchange, Córdoba, Argentina, Nov 2011.

Appointed *Junior Associate* of the Abdus Salam International Centre for Theoretical Physics (Trieste, Italy), 01.2011 – 12.2016.

Humboldt Research Fellow of the Alexander von Humboldt Foundation (Germany), 03.2008 – 09.2009. Granted *in recognition of previous scientific work*.

Postdoctoral Fellow, International Centre for Theoretical Physics (Trieste, Italy), 09.2004 – 09.2005.

Doctoral Fellow of CONICET (Argentina), 04.2000 – 08.2004.

Publication record summary

50 publications in international journals and refereed volumes including:

14 letters (PRL, APL, PRB-R, EPL)

1 invited topical review

1 book published by *Cambridge University Press*

37 publications as first or last author

1600 citations with h-index 23 (GoogleScholar, 09/2018)

More information including citations per publication can be obtained at Google Scholar (ID: Oi3Phu8AAAAJ) or Thomson's ResearcherID (B-1186-2008).

Selected Publications

The following short list is meant to give a flavor of the breadth of recent and past research. A full list of publications (with pdfs) is available at: <http://www.foatorres.com/publications/>

V. M. Martinez Alvarez, J. E. Barrios Vargas and **L. E. F. Foa Torres**.

Non-Hermitian robust edge states in one-dimension: Anomalous localization and eigenspace condensation at exceptional points

Physical Review B **97**, 121401(R) (2018). (6 pages)

doi:10.1103/PhysRevB.97.121401

P. M. Perez-Piskunow, G. Usaj, C. A. Balseiro and **L. E. F. Foa Torres**.

Floquet chiral edge states in graphene.

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Physical Review B **89**, 121401(R) (2014). (5 pages)

doi:10.1103/PhysRevB.89.121401

L. E. F. Foa Torres, P. M. Perez-Piskunow, C. A. Balseiro, and G. Usaj.

Multiterminal conductance of a Floquet Topological Insulator

Physical Review Letters **113**, 266801 (2014). (5 pages)

doi:10.1103/PhysRevLett.113.266801

G. Usaj, P. M. Perez-Piskunow, **L. E. F. Foa Torres**, and C. A. Balseiro.

Irradiated graphene as a tunable Floquet topological insulator

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Physical Review B **90**, 115423 (2014). (12 pages)

doi:10.1103/PhysRevB.90.115423

L. E. F. Foa Torres (author), S. Roche (author), and J.-C. Charlier (author).

Introduction to graphene-based nanomaterials: From electronic structure to quantum transport
Cambridge University Press (2014). (421 pages)

ISBN: 9781107030831

M. V. Bracamonte, G. I. Lacconi, S. Urreta and **L. E. F. Foa Torres**.

On the nature of defects in liquid-phase exfoliated graphene

Journal of Physical Chemistry C **118**, 15455 (2014). (5 pages)

doi:10.1021/jp501930a

H. L. Calvo, H. M. Pastawski, S. Roche, and **L. E. F. Foa Torres**.

Tuning laser-induced band gaps in graphene.

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Applied Physics Letters **98**, 232103 (2011). (3 pages)

doi:10.1063/1.3597412

L. E. F. Foa Torres and S. Roche.

Inelastic Quantum Transport and Peierls-Like Mechanism in Carbon Nanotubes.

Physical Review Letters. **97**, 076804 (2006). (4 pages)

doi:10.1103/PhysRevLett.97.076804

L. E. F. Foa Torres.

Mono-parametric quantum charge pumping: Interplay between spatial interference and photon-assisted tunneling.

Physical Review B **72**, 245339 (2005). (7 pages)

doi:10.1103/PhysRevB.72.245339

⁵According to Web of Science, as of April 2018, these papers received enough citations to place them in the top 1% of the academic field of Physics based on a highly cited threshold for the field and publication year. Furthermore the two papers marked above belong to the core four research papers of an emerging research front reported by Essential Science Indicators/WoS.

⁶Featured in APL Research Highlights, 2nd most read article of June 2011. This article is also in the *APL 50th anniversary Editor's Picks: The Most Notable Articles from APL*.

Research Profile

I am a condensed matter physicist and since 2016 I serve as Associate Professor of Physics at the University of Chile in Santiago. Here, I lead an interdisciplinary team (physicists and chemists) working on driven systems, quantum transport, the electronic and optoelectronic properties of two-dimensional materials and topological insulators. This team continues the activities that I started in my previous position at the University of Cordoba (UNC) in Argentina between 2009 and 2015. Before I worked in Argentina as a Professor and CONICET Independent Research Scientist; in Germany as a fellow of the Alexander von Humboldt Foundation (TU Dresden); in France, at CEA-Grenoble; and in Italy, at Trieste's International Centre for Theoretical Physics.

My expertise includes the theory and simulation of the electrical and quantum transport properties of nanomaterials (like graphene), many-body interactions (electron-electron and electron-phonon) and the physics of **driven systems**. **Inelastic effects deriving from electron-phonon interactions and time-dependent fields occupy a central stage in my contributions.**

During the first years of my career extending from my PhD and also later on during my second post-doc I focused mainly on the effect of electron-phonon interaction in transport through nanoscale systems (model systems, molecular systems and carbon nanotubes). During my first postdoc (at the Abdus Salam ICTP), I started working on driven systems by exploiting **Floquet theory**. This subject has fascinated me over the years, I kept this research line throughout my career. Initially, I focused on a phenomenon called *quantum pumping*. A direct current (dc) is usually associated to a dissipative flow of the electrons in response to an applied bias voltage. However, in systems of mesoscopic scale a dc current can be generated even at zero bias. This captivating quantum coherent effect is called **quantum pumping** (quantum charge pumping to be more precise). A device capable of providing such effect is called a quantum pump. My initial interest was to advance the understanding of this phenomenon beyond the adiabatic regime where there was a well established theory. Later on, I got interested in the current noise in driven systems, we found a subtle effect unique to driven systems, and quantum pumping in graphene-based devices.

Finally, in the last years I contributed to the physics of non-perturbative effects and topological states induced by a light-matter interaction (the so-called **Floquet topological states**). This is a new way of achieving properties akin those found in quantum Hall systems using a time-dependent potential in an otherwise trivial material. Specifically, we have clarified the nature and robustness of the light-induced topological in graphene, and the anomalous connection between them and their Hall response. On the experimental side I have been personally involved in the isolation of graphene mono and multilayers using mechanical and chemical methods and their characterization using Raman spectroscopy, once more light-matter interaction turned out to be a crucial helping tool. For more on my research see <http://www.foatorres.com/research/>.

The next section summarizes what I consider my most relevant contributions.

Main Scientific Achievements

My works combine insights in condensed matter concepts with technology driven goals. My main scientific achievements include:

Prediction of anomalous localization in non-Hermitian systems [V. M. Martinez-Alvarez et al., *Physical Review B* **97**, 121401(R) (2018)], whereby a pristine non-Hermitian lattice may become devoid of extended states. This work published in March 2018 has already collected more than 20 citations, see this [link](#).

Elucidating laser-induced chiral edge states in graphene [Perez-Piskunow *et al.* *Physical Review B* **89**, 121401(R) (2014); Usaj *et al.* *Physical Review B* **90**, 115423 (2014)] as well as their Hall response [Foa Torres *et al.* *Physical Review Letters* **113**, 266801 (2014)]. According to Web of Science, two of these articles already form the core highly cited papers of an emerging research front on periodically driven systems.

Prediction of tunable laser-induced bandgaps in graphene using mid-infrared lasers [Calvo et al. *Applied Physics Letters* **98**, 232103 (2011)]. The same physics was recently observed at the surface of a topological insulator [Wang et al. *Science* **342**, 453 (2013)], see also commentary at MIT news.

Prediction of a Peierls-like mechanism in carbon nanotubes at high bias. [Foa Torres and Roche, *Physical Review Letters* **97**, 076804 (2006)].

Elucidating the role of time-dependent fields in quantum charge pumping (the generation of a current at zero bias) with a single time-dependent gate voltage [Foa Torres, *Physical Review B* **72**, 245339 (2005)]. Experiments on single-parameter pumps came later in 2008 [PRB **77**, 153301 (2008)] holding great promise either in metrology or for new devices operating at the quantum limit.

A proposal for the electrical generation of coherent ultrasound by electrical means in semiconductors, i.e. a phonon laser [Foa Torres et al. *Physical Review B* **64**, 193304 (2001); Camps et al. *Physical Review B* **64**, 125311 (2001)]. This kind of devices was first demonstrated experimentally recently (see for example <http://physics.aps.org/articles/v3/16>).

Collaborations

Ongoing/recent collaborations with the following groups/individuals both within and outside the present home institution:

Stephan Roche (ICN, Barcelona).

Jean-Christophe Charlier (UCL, Belgium).

J erome Cayssol, R emi Avriller and Fabio Pistolesi (Bordeaux, France).

Gonzalo Usaj and C. A. Balseiro (CAB, Bariloche, Argentina).

Pedro Orellana and Eric Suarez-Morell (UTFSM, Chile).

Hern an Calvo (University of C ordoba, Argentina).

 lvaro N nuez and Diana Dulic (University of Chile).

Nikolai Kalugin (NMT, USA) and Chun Ning (Jeanie) Lau (UCR, USA).

Outreach

2014.12.19 "Meet the authors of Introduction to Graphene-Based Nanomaterials", video prepared by Cambridge University Press, distributed through their website and youtube.

2012.09.29 "Lo m s importante en la ciencia son las preguntas", interview for the local newspaper La Voz del Interior.

2011.07 "Time-dependent fields for a new breed of carbon-based nanodevices", invited article for the nano website azonano.com (Australia).

2011.08.07 "Cover Story: No optical illusion", William Leventon for MICROmanufacturing Magazine, July/August 2011, p. 28.

2011.07.20 "Lasers could produce much sought after band gaps in graphene", Lisa Zyga for PhysOrg (science news).

2011.06.17 "Graphene may gain on-off switch", Press Release by the American Institute of Physics.

2010.10.06 "El grafeno, sus secretos, y la investigaci n en C rdoba", short article written for the local newspaper La Voz del Interior, on the occasion of the Nobel Prize in Physics 2010.

2008.10.01 "G ste aus Indien und Argentinien an der TUD", interview published in the Dresden Universit ts Journal.

Invited and Contributed talks

Invited/Plenary talks at Conferences/Meetings

34. 2018.06.27 "Tailoring one-way transport and non-reciprocity in graphene-based devices", **Invited talk** given at the Graphene 2018 Conference, June 26-29th, 2018, Dresden, Germany.

33. 2018.06.14 *"Using light as a topological switch"*, **Invited talk** given at the Field Theory and Condensed Matter Theory Workshop, Universidad San Sebastián, June 14th, 2018, Santiago, Chile.
32. 2018.04.25 *"Teoría de Floquet para sistemas forzados en materia condensada"*, **Invited tutorial** given at the 1er Taller Argentino de Cuántica – Cuantos 2018, Universidad Nacional de Córdoba, April 25-27th, 2018, Córdoba, Argentina.
31. 2017.11.30 *"Harnessing the electronic structure of materials: from laser-induced robust states to crafted nonreciprocal bandstructures"*, **Invited talk** given at the Workshop VII Workshop on Novel Methods for Electronic Structure Calculations, Universidad de Chile, November 29 - December 1, 2017, Santiago, Chile.
30. 2017.11.24 *"From Floquet Topological Insulators to Floquet Isolators"*, **Invited talk** (opening plenary lecture), VII Reunión Nacional de Sólidos, SOLIDOS2017, November 22-24, Bahía Blanca, Argentina.
29. 2017.09.25 *"From Floquet topological insulators to Floquet isolators: A path from topological switching to transport steering"*, **Invited talk** at the international conference on *Transport at the Nanoscale*, Centro Internacional de Ciencias (CIC), September 25 - 29, Cuernavaca, Mexico.
28. 2016.11.29 *"Using light as a topological switch: The roads towards Floquet topological insulators"*, **Invited talk** given at the ICTP Workshop on Driven Quantum Systems, Nov 28 - Dec 2, San Carlos de Bariloche, Argentina.
27. 2016.05.12 *"Transporte unidireccional de carga, valle y espín en heteroestructuras tipo van der Waals"*, **Invited talk** given at the XVI Encuentro Superficies y Materiales Nanoestructurados, NANO2016, May 11-13, Buenos Aires, Argentina.
26. 2016.03.14 *"Crafting one-way transport of charge and spin"*, **Invited talk** given at the Workshop *Los Andes Spintronics*, Universidad de Chile, March 14-15, 2016, Santiago, Chile.
25. 2015.11.13 *"From Raman characterization to novel topological phases in graphene"*, **Invited talk** given at the first Workshop on Graphene and 2D Materials, Y-TEC and INIFTA, November 12-13, 2015, La Plata, Argentina.
24. 2015.11.12 *"Welcome to flatland: An introduction to graphene and other 2d materials"*, **Invited tutorial** given at the first Workshop on Graphene and 2D Materials, Y-TEC and INIFTA, November 12-13, 2015, La Plata, Argentina.
23. 2015.06.03 *"Using light as a topological switch: The road towards Floquet topological insulators"*, **Invited talk** at the Conference on Nano Electromechanical Systems and Beyond (NEMB), June 3-5, 2015, Bordeaux, France.
22. 2015.05.08 *"The road towards Floquet topological states: Using light as a topological switch"*, **Invited talk** (scheduled) 17th Brazilian Workshop on Semiconductor Physics (BWSP-17), May 3-8, 2015, Minas Gerais, Brazil.
21. 2015.03.11 *"Harnessing light to tune the topology of materials"*, **Invited talk** Graphene 2015 Conference (grapheneconf.com), March 10-13, 2015, Bilbao, Spain.
20. 2015.01.07 *"Quantum Hall Effects, Topological insulators and a new type of order"*, **Invited lecture** given at the VII School on Nanostructures, January 6-9, 2015, Valparaíso, Chile.
19. 2015.01.06 *"Welcome to flatland: An introduction to graphene and other 2d materials"*, **Invited lecture** given at the VII School on Nanostructures, January 6-9, 2015, Valparaíso, Chile.
18. 2014.10.24 *"Illuminating graphene: From Raman characterization to novel quantum Hall phases in 2D"*, **Invited talk** (scheduled) Nano-Cordoba 2014, October 22-24, 2014, Cordoba, Argentina.
17. 2013.05.08 *"Iluminando el Grafeno: Desafíos y oportunidades"*, **Invited talk** given at the XIII Encuentro Superficies y Materiales Nanoestructurados, Mar del Plata, Argentina.
16. 2012.11.08 *"An introduction to the properties of Graphene"*, **Invited lecture** given at the NANO-Andes School on Nanostructures 2012, Quito, Ecuador.
15. 2012.04.13 *"Tuning the transport properties of graphene through AC fields"*, contributed talk, plenary session of the Graphene 2012 conference, Brussels, Belgium.
14. 2011.11.12 *AC fields for a new breed of carbon-based devices*, **Invited talk** given at the "IV National Solid State Meeting 2011", San Miguel de Tucumán, Argentina.

13. 2011.09.16 "*Harnessing time-dependent fields in carbon-based nanostructures: Floquet theory approach for charge transport*", **Invited talk** given at the "School on Carbon Nanostructures", Fortaleza, Brazil.
12. 2011.07.22 "*Time-dependent transport in graphene: Floquet theory for the treatment of laser fields and ac gates*", **Invited talk** given at the IV School on nanostructures and 1st Workshop on nanosciences, Antofagasta, Chile.
11. 2011.07.21 "*Breve introducción a las propiedades del grafeno*", **Invited lecture** given at the IV School on nanostructures and 1st Workshop on nanosciences, Antofagasta, Chile.
10. 2011.03.31 "*AC transport at the nanoscale: opportunities and challenges for a new breed of carbon-based devices*", **Invited talk** given at the "20th Latin American Symposium on Solid State Physics (SLAFES XX)", Maragogi, Brazil.
9. 2010.12.03 "*AC transport in carbon-based devices*", **Invited talk** given at the "School on Nanostructured Systems: electronic transport and spintronics", UFF, Niteroi, Brazil.
8. 2010.12.02 "*Inelastic effects at the nanoscale*", **Invited lecture** given at the "School on Nanostructured Systems: electronic transport and spintronics", UFF, Niteroi, Brazil.
7. 2010.09.03 "*AC transport in carbon-based devices: opportunities and challenges for a new breed of nanodevices*", **Invited talk** given at the Workshop on Inelastic Transport Phenomena, Donostia International Physics Center, Spain.
6. 2008.12.04 "*Control of the conductance and noise of driven carbon-based Fabry-Perot devices*", **Invited talk** given at the International Workshop on "Nonequilibrium Nanostructures" (NonNa08), MPIPKS, Dresden, Germany.
5. 2008.09.09 "*Control of the conductance and noise of driven carbon-based devices*", **Invited talk** given at the "6th International Workshop on Disordered Systems", La Falda, Argentina.
4. 2008.07.31 "*Charge transport through ac driven carbon-based nanostructures: scrutinizing the conductance and noise*", **Invited talk** given at "The 25th European Conference on Surface Science" (ECOSS 25), Liverpool, UK.
3. 2006.12.21 "*Inelastic Effects on Transport through Carbon Nanotubes*", **Invited talk** given at the "Jornadas de Ciencia y Sociedad a los 50 Años de FaMAF", Cordoba, Argentina.
2. 2006.10.16 "*Inelastic Quantum Transport in Carbon Nanotubes: Conductance Gaps and Lifting of Degeneracies in Fock space*", **Invited talk** given at the "Nano-E / GDR-E06 meeting on Science and applications of nanotubes", Obernai (France).
1. 2004.09.21 "*Anti-resonances as precursors of decoherence*", **Invited talk** given at the "89th Meeting of the Argentine Physical Society", Condensed Matter parallel session, Bahia Blanca, Argentina.

Other Selected talks

- 2017.08.02 "*La ruta hacia la computación cuántica*", invited colloquium given at the Department of Physics, FCFM, University of Chile, Santiago, Chile.
- 2016.12.07 "*Del premio Nobel de Física a los aislantes topológicos*", invited colloquium given at the Faculty of Sciences of the University of Chile on the occasion of the symposium *Chile Nobel*, Santiago, Chile.
- 2016.10.28 "*The road towards Floquet topological insulators*", invited seminar given at ICN2, Barcelona, Spain.
- 2016.06.08 "*Aislantes topológicos: una nueva estrella en la física de la materia condensada*", invited colloquium given at the Department of Physics, University of Santiago de Chile (USACH), Santiago, Chile.
- 2016.05.22 "*El grafeno y la época dorada de los nuevos materiales*", invited colloquium given at the Department of Physics, FCFM, University of Chile, Santiago, Chile.
- 2015.10.22 "*The road towards Floquet Topological Insulators: Using light as a topological switch*", invited seminar given at the Institute for Theoretical Physics, Karlsruhe, Germany.
- 2015.10.21 "*From Raman characterization to novel laser-induced topological phases in graphene*", invited seminar given at the Institute of Nanotechnology of the Karlsruhe Institute of Technology, Karlsruhe, Germany.

2015.02.17 *"Topological insulators and a new type of order: Opportunities in physics, chemistry and materials science"*, General Department Seminar at the University of Trieste (Chemistry), Trieste, Italy.

2012.10.25 *"Sintonizando las propiedades de transporte de nanodispositivos mediante campos alternos"*, invited seminar given at Centro Atómico Bariloche, San Carlos de Bariloche, Argentina.

2012.07.30 *"Tuning the transport properties of graphene through AC fields"*, invited seminar given at the Condensed Matter Section of the International Centre for Theoretical Physics, Trieste, Italy.

2008.02.26 *"Scrutinizing the Conductance and Noise of Carbon Based Nanostructured devices"*, contributed talk at the Spring Meeting of the German Physical Society, Berlin.

2007.12.17 *"Work in progress within Cardeq EU Project"*, talk given at the Helsinki Low Temperature Laboratory (host: Prof. Pertti Hakonen), Helsinki.

2007.07.25 *"Inelastic Transport through Carbon Nanotubes: Role of Electron-Phonon Interaction on Current Saturation at High Bias"*, invited talk given at the IfW, TU Dresden, Dresden.

2007.07.20 *"On the Effects of Electron-Phonon interaction on transport through Carbon Nanotubes: Lifting of Degeneracies in Fock Space"*, contributed talk at the 12th International Conference on Phonon Scattering in Condensed Matter (Phonons 2007) Paris.

2005.02.10 *"On the connection between the problem of an electron tunneling in the presence of phonons and a time periodic potential"*, seminar on disorder and strong electron correlations, Condensed Matter Section, International Centre for Theoretical Physics, Trieste.

Research Grants and Funding

I have benefited from different research grants during my career. This includes funding from the Alexander von Humboldt Foundation (Germany), CONICET and ANPCyT (Argentina) and FondeCyT (Chile). At the moment I am the PI of a FondeCyT Regular Project (Chile) and a starting grant from the University of Chile, I also serve as host of two Postdoctoral Projects from FondeCyT (Chile).

Teaching experience and interests

I have started taking teaching duties during the last year of my Physics degree, back in 1999. Since then I have accumulated teaching experience at both graduate and undergraduate levels in Argentina, France, Germany and Chile. At the undergraduate level I taught Physics, Mathematics and Materials Science to a broad spectrum of students in Physics, Chemistry, Materials Science, Computer Science and Engineering. At the graduate level, I taught solid state physics, quantum transport and molecular electronics to graduate and advanced students of Physics and Chemistry.

Since 2016, when I joined the University of Chile, I have taught Quantum Mechanics (2016, 2017 and 2018), Introduction to Physics (2016 and 2017), Quantum Transport (2016), Introduction to Solid State Physics (2018) and an Introductory course to Graphene and Topological Insulators (2018).

Supervision of students, postdocs and early stage researchers

Early stage researchers

Director of Dr. Hernan L. Calvo, Assistant researcher at CONICET, Argentina (tenure-track), April 2014 - December 2016.

Co-director of Dr. Victoria Bracamonte, Assistant researcher at CONICET, Argentina (tenure-track), April 2016-June 2017.

Postdocs

Director (*Investigador Patrocinante*) of Dr. José Eduardo Barrios Vargas, postdoc funded by "FondeCyT Postdoctorado" grant number 3170126, March 2017 - present (FCFM, Universidad de Chile).

Director (*Investigador Patrocinante*) of Dr. Matías Berdakin, postdoc funded by "FondeCyT Postdoctorado" grant number 3170143, March 2017 - present (FCFM, Universidad de Chile).

Director of the postdoctoral fellowship (CONICET, Argentina) of Dr. Hernan L. Calvo, November 2013- March 2014 (now adjoint researcher at CONICET).

Director of the postdoctoral fellowship (CONICET, Argentina) of Dr. Victoria Bracamonte, April 2013-March 2015 (now researcher at CONICET, Argentina).

Director of the postdoctoral fellowship (CONICET, Argentina) of Dr. Hernan L. Calvo, April 2010-December 2010 (then moved to RWTH Aachen-Germany).

PhD students

Director of the PhD Thesis of Esteban Rodríguez Mena, with a doctoral fellowship granted by ConiCyT (Chile), April 2017-present (ongoing).

Director of the PhD Thesis of Virginia Dal Lago, with a doctoral fellowship granted by CONICET (Argentina), April 2013-present. The thesis was successfully defended on October 10, 2017, Universidad Nacional de Córdoba, Argentina. [PhD Thesis available online.]

Director of the PhD Thesis of Pablo Perez Piskunow, with a doctoral fellowship granted by CONICET (Argentina), April 2012-December 2015. The thesis "On the Effects of Radiation on the Transport Properties of Graphene" was successfully defended on December 1st, 2015, Universidad Nacional de Córdoba, Argentina. Pablo then moved to work as a postdoctoral fellow at Delft University of Technology. [PhD Thesis available online.]

Director of the PhD Thesis of Lucas Ingaramo, with a doctoral fellowship granted by CONICET (Argentina), April 2012-September 2016. The thesis "Charge transport in carbon nanostructures in the presence of defects" was successfully defended on September 15, 2016, Universidad Nacional de Córdoba, Argentina. [PhD Thesis available online.]

Masters' Thesis

Co-tutor of the Magister thesis of Juan Pablo Ramos Andrade, UCN, Chile, July 2012-April 2013, defended on April 2013.

Co-tutor of the Magister thesis of César Núñez, UTFSM, Chile, July 2012-April 2013, defended on April 2013.

Director of the undergraduate thesis (Masters' level) of Pablo Perez Piskunow, April 2011-March 2012, defended on March 2012.

Director of the undergraduate thesis (Masters' level) of Lucas Ingaramo, April 2010-March 2011, defended on March 2011.

Academic service

Commissions of trust

Member of the Organizing Committee of the 9th International Conference on Low Dimensional Structures and Devices (LDS), 2019.

Member of the *International Scientific Committee of the Graphene 2019 Conference* (Rome, 2019).

Member of the Scientific Committee of the 10th School on Nanostructures (Valparaiso), 2018.

Section Editor LT27: Proceedings of the *27th International Conference on Low Temperature Physics* (Quantum Transport Section), published in *Journal of Physics Conference Series*, volume 568, 2014 (ca. 70 submissions handled in the quantum transport section)⁷

Member of the Scientific Committee of the 22nd Latin American Symposium on Solid State Physics (SLAFES), 2015.

Member of the Scientific Committee of the Quantum Transport section at the *27th International Conference on Low Temperature Physics* (LT27), 2014.

Member of the Scientific Committee of the "XV Meeting on Surfaces and Nanostructured Materials", Rosario, Argentina, May 2015.

⁷The LT series is the flagship international conference in low temperature physics taking place every three years promoted by IUPAP through its Commission C5 on Low Temperature Physics. The 2014 edition was the first one held in the Southern hemisphere, see <http://lt27.df.uba.ar/>

Member of the Scientific Committee of the "XIV Meeting on Surfaces and Nanostructured Materials", Bariloche, Argentina, May 2014.

Member of the Scientific Committee of the "XIII Meeting on Surfaces and Nanostructured Materials", Mar del Plata, Argentina, May 2013.

Coordinator of the Condensed Matter Division of the Argentine Physical Society, 09/2010-09/2011.

Member of the Executive Committee of the Condensed Matter Division of the Argentine Physical Society, elected in first position by the vote of its members, 09/2010-09/2013.

Reviewing of Projects/Funding

Reviewer for the National Science Foundation (NSF), USA (2015, 2017).

Reviewer for the French Research Agency (ANR), France (2015).

Reviewer for Israel Science Foundation (ISF), Israel (2015).

Reviewer for the Czech Science Foundation, Czech Republic (2014-2018).

Reviewer for ANPCyT (Materials Science and Physics panels), Argentina (2013, 2015, 2016, 2018).

Reviewer for CONICET, Argentina (2011-2015).

Reviewer for the University of Buenos Aires, Argentina (2014, 2016).

Reviewer for ANII, Uruguay (2011-2012).

Reviewer for CSIC, Universidad de la República, Uruguay (2016).

Reviewer for FWO, Belgium (2009).

Reviewer for CONICYT, Chile (2015-2018).

Reviewer for the New Mexico Tech, USA (2017).

Reviewer for ResearchNet, Canada (2017).

Peer review in international journals

Referee for the following societies and their journals:

American Physical Society (APS): Physical Review Letters, Physical Review X, Physical Review B, Physical Review A, Physical Review Applied and Physical Review Materials;

American Chemical Society (ACS): NanoLetters, Journal of Physical Chemistry C, The Journal of Physical Chemistry Letters;

Royal Society of Chemistry (RSC): Nanoscale;

American Institute of Physics (AIP): Applied Physics Letters, Journal of Applied Physics;

Institute of Physics (IoP): Reports on Progress in Physics, New Journal of Physics, Nanotechnology, Journal of Physics Condensed Matter, Journal of Physics A: Mathematics and General, Physica Scripta;

European Physical Society: EPL, European Journal of Physics B.

Nature Publishing Group (NPG): Nature Physics, Scientific Reports.

Examination of PhD Thesis

Member of the examination jury of the PhD thesis of:

Dr. Nicolás Vidal Silva, Universidad de Santiago de Chile, Chile, September 2018.

Dr. Leandro Tosi, Instituto Balseiro, Universidad Nacional de Cuyo, Argentina, June 2015.

Dr. Bruno Rizzo, Universidad de Buenos Aires, Argentina, April 2015.

Dr. Diego Mastrogiuseppe, Instituto de Física de Rosario, Argentina, September 2011.

Dr. Eric Suárez Morell, UTFSM, Valparaíso, Chile, December 2011.

Dr. Federico Foieri, Universidad de Buenos Aires, Argentina, October 2010.

Organization of conferences and scientific events

Member of the organizing committee of *Nano-Cordoba 2012*, Villa Carlos Paz, Argentina, 1-3 October 2012. (ca. 120 participants) <http://www.nanocordoba2012.com.ar/>

Organizer of the “*XII Meeting on Surfaces and Nanostructured Materials*”, La Falda, Argentina, 16-18 May 2012. (ca. 110 participants)

Member of the organizing committee of *Nano-Cordoba 2011*, Cordoba (Argentina), 21-23 March 2011. (ca. 80 participants) <http://www.famaf.unc.edu.ar/nano-cordoba/nano-cordoba2011/index.html>

Other academic duties/activities

Coordinator of the computer network at the Department of Physics, FCFM, University of Chile, 2017-present.

Organizer of the Physics Seminars at FaMAF-UNC, 10.2009 – 09-2015.

Translator of chapter 10 of the popular engineering textbook “**Physique des semi-conducteurs et des composants électroniques**” (by Henry Mathieu and Hervé Fanet) from French to Spanish. The Spanish edition “*Física de semiconductores y Componentes Electrónicos*” has been published by UNAM (Mexico) on March 2014, (975 pages) ISBN: 978-607-02-2948-0.

Languages

Spanish (mother tongue); English (full working proficiency); French (fluent written and spoken); Italian (fluent spoken); German (Intermediate) and Portuguese (basics).