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Rodrigo Soto Garrido

Research and Teaching Interests

Teaching: Teaching and innovation in Physics and Engineering courses.

Research: Strongly correlated systems, unconventional superconductivity, topological phases of matter, one dimensional systems, connections of high-enery physics and condensed matter physics (such as holography) and statistical models.

Education

2015 **Ph.D. in Physics**, *U. of Illinois at Urbana-Champaign*.
- Thesis: Pair Density Wave Superconducting States and Statistical Mechanics of Dimers. Advisor: Eduardo Fradkin.

2009 **Master's degree in Physics**, *U. Técnica Federico Santa María*.
- Thesis: Metastable magnetic states in the triangular-lattice. Advisor: Patricio Vargas.

2009 **Professional degree in Civil Engineering (with honors)**, *Egresado in 2007 ranked 1/55*, U. Técnica Federico Santa María.

Experience

2019- **Assistant Professor**, *Inst. of Physics*, Pontificia Universidad Católica de Chile.
- Courses: Electricity and Magnetism, Statics and Dynamics, Classical Mechanics II.

2015-2019 **Assistant Professor**, Universidad San Sebastián.
- Courses: Electricity and Magnetism, Hydraulics, Mechanics of Solids, Structural Analysis and Fluid Mechanics.

2015-2019 **Lecturer in Physics**, *Inst. of Physics*, Pontificia Universidad Católica de Chile.
- Part time lecturer in Physics: Electricity and Magnetism, Statics and Dynamics.

2010–2015 **Graduate Research Assistant**, *Dept. of Physics*, U. of Illinois at Urbana-Champaign.
- Research in Theoretical Condensed Matter Physics and Mathematical Physics.
- Preparation of technical publications and presentation of main results at conferences.

2009–2015 **Graduate Teaching Assistant**, *Dept. of Physics*, U. of Illinois at Urbana-Champaign.
- Teaching assistant for different courses in undergraduate and graduate physics. These include: Advanced Field Theory, Relativity and Math applications, Electromagnetism, Classical Mechanics.

2009 **Lecturer in Physics**, *Dept. of Physics*, U. Técnica Federico Santa María.
- Part time lecturer in Physics: Introduction to Physics.

2003-2009 **Teaching Assistant**, *Dept. of Physics*, U. Técnica Federico Santa María.
- Teaching assistant for different courses in undergraduate and graduate physics. These include: Quantum Mechanics, Statistical Mechanics, Solid State Physics, General Physics I: Mechanics.
- Teaching assistant coordinator for General Physics I: Mechanics

2004-2006 **Undergraduate Research Assistant**, *Dept. of Physics*, U. Técnica Federico Santa María.
- Assistance in the fabrication and characterization of Carbon Nanotubes in Patricio Häberle's group.

Languages

Spanish Native

English Full professional proficiency

Computer skills

Software Mathematica, Matlab, Python, Fortran

Awards

2010 **Ismael Valdés Valdés Award**, *Instituto de Ingenieros (Chilean Institute of Engineers).*

2009 **Becas Chile Scholarship**, *Chile's National Commission for Scientific and Technological Research (CONICYT).*

2007 **Postgraduate Studies Scholarship**, *Chile's National Commission for Scientific and Technological Research (CONICYT).*

2004 **Núcleo Milenio Undergraduate Research Scholarship**.

Others: Selected for the Phi Kappa Phi (selects top 10% grad students) and Tau Beta Pi honor societies. Several travel awards, cuadro de honor (USM), Programa Incentivo a la Iniciación Científica (2008, USM)

Grants

2020 **FONDECYT Regular**, *Principal Investigator*, Grant Number 1200399.
- Title: Field Theories and Holography in Quantum Matter

2019 **ANID PIA Anillo**, *Associate Investigator*, Grant Number ACT192023.
- Title: Light-Matter Interactions in Topological Nanomaterials: Towards low-consumption Information Technology

2019 **FONDECYT Regular**, *Coinvestigator*, Grant Number 1190361.
- Title: Manybody Physics in Topological Materials

2016 **FONDECYT Iniciación en Investigación**, *Principal Investigator*, Grant Number 11160542.
- Title: Strongly Correlated Systems in Condensed Matter Physics

Publications

2020 Vladimir Juričić, Ignacio Salazar Landea and **Rodrigo Soto-Garrido**. Phase transitions in a holographic multi-Weyl semimetal. Journal of High Energy Physics **06**(2020), 200

2020 Julian May-Mann, Ryan Levy, **Rodrigo Soto-Garrido**, Gil Young Cho, Brian K. Clark and Eduardo Fradkin. Topology and the one-dimensional Kondo-Heisenberg model. Phys. Rev. B **101**, 165133

2020 **Rodrigo Soto-Garrido**, Enrique Muñoz and Vladimir Juričić. Dislocation defect as a bulk probe of monopole charge of multi-Weyl semimetals. Phys. Rev. Research **2**, 012043(R), Editor's Suggestion

2019 Enrique Muñoz and **Rodrigo Soto-Garrido**. Thermoelectric transport in torsional strained Weyl semimetals J. Appl. Phys. **125**, 082507

2019 Guillermo Fuertes, Manuel Vargas, Miguel Alfaro, **Rodrigo Soto-Garrido**, Jorge Sabattin and María Alejandra Peralta. Chaotic Genetic Algorithm and The Effects of Entropy in Performance Optimization. Chaos **29**, 013132

2018 Gastón Giordano, Nicolás Grandi, Adrián Lugo and **Rodrigo Soto-Garrido**. Strange metal crossover in the doped holographic superconductor. Journal of High Energy Physics **10**(2018), 068

2018 **Rodrigo Soto-Garrido** and Enrique Muñoz. Electronic transport in torsional strained Weyl semimetals. J. Phys.: Condens. Matter **30**, 195302

2017 **Rodrigo Soto-Garrido**, Yuxuan Wang, Eduardo Fradkin and S. Lance Cooper. Higgs Modes in the Pair Density Wave Superconducting State. Phys. Rev. B **95**, 214502

2017 Enrique Muñoz and **Rodrigo Soto-Garrido**. Analytic approach to magneto-strain tuning of electronic transport through a graphene nanobubble: Perspectives for a strain sensor J. Phys.: Condens. Matter **29**, 445302

2015 **Rodrigo Soto-Garrido**, Gil Young Cho, and Eduardo Fradkin. Quasi-one-dimensional pair density wave superconducting state. Phys. Rev. B **91**, 195102

2014 Gil Young Cho, **Rodrigo Soto-Garrido** and Eduardo Fradkin. Topological Pair-Density-Wave Superconducting States Phys. Rev. Lett. **113**, 256405

2014 **Rodrigo Soto-Garrido** and Eduardo Fradkin. Pair-density-wave superconducting states and electronic liquid-crystal phases. Phys. Rev. B **89**, 165126

2014 Philippe Di Francesco and **Rodrigo Soto-Garrido**. Arctic curves of the octahedron equation. J. Phys. A: Math. Theor. **47**, 285204. **IOP Select**

2009 P. Landeros, P. R. Guzmán, **R. Soto-Garrido** and J Escrig. Magnetostatic fields in tubular nanostructures. J. Phys. D: Appl. Phys. **42**, 225002

2009 **R. Soto**, G. Martínez, M. N. Baibich, J. M. Florez, and P. Vargas. Metastable states in the triangular-lattice Ising model studied by Monte Carlo simulations: Application to the spin-chain compound $Ca_3Co_2O_6$. Phys. Rev. B **79**, 184422

2006 Rodrigo Segura, Wladimir Ibáñez, **Rodrigo Soto**, Samuel Hevia, and Patricio Häberle. Growth Morphology and Spectroscopy of Multiwalled Carbon Nanotubes synthesized by pyrolisis of Iron Phthalocyanine. J. Nanosci. Nanotechnol., Vol. **6**, No. 7

Conferences, Programs, and Talks

2020 **American Physical Society March Meeting**, *Contributed Talk*, Denver, Co. USA.

2019 **American Physical Society March Meeting**, *Contributed Talk*, Boston, MA USA.

2019 **Colloquium Institute of Physics**, Pontificia Universidad Católica de Chile, Invited talk. Santiago, Chile.

2018 **Engineering and Sciences**, Universidad Adolfo Ibáñez, Invited talk. Santiago, Chile.

2018 **Strings, Higher Spins and Dualities**, Invited Talk. Pucón, Chile.

2018 **American Physical Society March Meeting**, *Contributed Talk*, Los Angeles, CA USA.

2018 **Department of Physics**, Universidad Andrés Bello, Invited talk. Santiago, Chile.

2017 **American Physical Society March Meeting**, *Contributed Talk*, New Orleans, LA USA.

2016 **Meeting on Theoretical Physics**, Universidad San Sebastián, Invited talk. Valdivia, Chile.

2016 **Seminario de Educación**, Universidad Autónoma Gabriel René Moreno, Invited talk. Santa Cruz, Bolivia.

2016 **Workshop Los Andes Spintrónicos**, Universidad de Chile, Invited talk. Santiago, Chile.

2016 **Colloquium Institute of Physics**, Pontificia Universidad Católica de Chile, Invited talk. Santiago, Chile.

2015 **Condensed Matter Seminar**, Universidad Técnica Federico Santa María, Invited talk. Santiago, Chile.

2015 **American Physical Society March Meeting**, *Contributed Talk*, San Antonio, TX USA.

2014 **Integrability and Representation Theory Seminar**, *Math Seminar UIUC*, Invited talk, Urbana, IL. USA.

2014 **Society for Industrial and Applied Mathematics**, *Conference on Discrete Mathematics*, Symposium invited talk, Minneapolis, MN. USA.

2014 **Center for Emergent Superconductivity Workshop**, *Urbana, IL. USA*.

2014 **Entangled Quantum Matter and Topology Workshop**, *Urbana, IL. USA*.

2014 **Workshop on Strongly Correlated Electron Systems at 60 years old**, *Urbana, IL. USA*.

2014 **American Physical Society March Meeting**, *Contributed Talk*, Denver, Co. USA.

2013 **American Physical Society March Meeting**, *Contributed Talk*, Baltimore, MD. USA.

2013 **Theory Winter School**, *Unconventional Superconductivity*, Tallahassee, FL. USA.

2012 **Workshop on Topology, Entanglement and Strong Correlations in Condensed Matter**, *Urbana, IL. USA*.

2012 **American Physical Society March Meeting**, *Contributed Talk*, Boston, MA. USA.

2008 **International Centre For Theoretical Physics Winter School**, *Micro and Nano photonics For Life Sciences*, Trieste, Italy.

2008 **Simposio Chileno de Física**, *Valparaíso, Chile*.