

Sebastián Alejandro Díaz Santiago

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RESEARCH INTERESTS

Theoretical Condensed Matter Physics:

- Electronic and Spin Transport Phenomena
- Magnetic Skyrmions
- Nanoscale Magnetism & Superconductivity
- Topological Magnonics

PUBLICATIONS

- “Majorana Bound States Induced by Antiferromagnetic Skyrmion Textures,” S. A. Díaz, J. Klinovaja, D. Loss, and S. Hoffman, [arXiv:2102.03423 \[cond-mat.str-el\]](https://arxiv.org/abs/2102.03423) (2021).
- “Chiral Hinge Magnons in Second-Order Topological Magnon Insulators,” A. Mook, S. A. Díaz, J. Klinovaja, and D. Loss, [arXiv:2010.04142 \[cond-mat.mes-hall\]](https://arxiv.org/abs/2010.04142) (2020).
- “Magnonic Quadrupole Topological Insulator in Antiskyrmion Crystals,” T. Hirose, S. A. Díaz, J. Klinovaja, and D. Loss, [Physical Review Letters](https://doi.org/10.1103/PhysRevLett.125.207204) **125**, 207204 (2020).
- “Spin Wave Radiation by a Topological Charge Dipole,” S. A. Díaz, T. Hirose, D. Loss, and C. Psaroudaki, [Nano Letters](https://doi.org/10.1021/acs.nanolett.0c02000) **20**, 6556 (2020).
- “Chiral Magnonic Edge States in Ferromagnetic Skyrmion Crystals Controlled by Magnetic Fields,” S. A. Díaz, T. Hirose, J. Klinovaja, and D. Loss, [Physical Review Research](https://doi.org/10.1103/PhysRevResearch.2.013231) **2**, 013231 (2020).
- “Topological Magnons and Edge States in Antiferromagnetic Skyrmion Crystals,” S. A. Díaz, J. Klinovaja, and D. Loss, [Physical Review Letters](https://doi.org/10.1103/PhysRevLett.122.187203) **122**, 187203 (2019).
- “Avalanches and Criticality in Driven Magnetic Skyrmions,” S. A. Díaz, C. Reichhardt, D. P. Arovas, A. Saxena, and C.J.O. Reichhardt, [Physical Review Letters](https://doi.org/10.1103/PhysRevLett.120.117203) **120**, 117203 (2018).
- “Fluctuations and noise signatures of driven magnetic skyrmions,” S. A. Díaz, C.J.O. Reichhardt, D. P. Arovas, A. Saxena, and C. Reichhardt, [Physical Review B](https://doi.org/10.1103/PhysRevB.96.085106) **96**, 085106 (2017).
- “Quantum Nucleation of Skyrmions in Magnetic Films by Inhomogeneous Fields,” S. A. Díaz and D. P. Arovas, [arXiv:1604.04010 \[cond-mat.str-el\]](https://arxiv.org/abs/1604.04010) (2016).
- “Controlling skyrmion helicity via engineered Dzyaloshinskii-Moriya interactions,” S. A. Díaz and R. E. Troncoso, [Journal of Physics: Condensed Matter](https://doi.org/10.1088/1741-4326/ab0005) **28**, 426005 (2016).
- “The role of measurement time on the universal crossover from $1/f$ to non- $1/f$ noise behavior,” S. A. Díaz and M. Di Ventra, [Journal of Computational Electronics](https://doi.org/10.1088/1741-4326/14/2/023) **14**, 203 (2015).
- “Current-induced exchange interactions and effective temperature in localized moment systems,” S. A. Díaz and A. S. Núñez, [Journal of Physics: Condensed Matter](https://doi.org/10.1088/1741-4326/24/11/116001) **24**, 116001 (2012).

INVITED TALKS

- July 3
2020** “Topological Magnonic Edge and Corner States in Skyrmion Crystals”
ONLINE SPINTRONICS SEMINAR SERIES
USA.
- June 3
2020** “Magnonic Quadrupole Topological Insulator in Antiskyrmion Crystals”
MAX PLANCK INSTITUTE OF MICROSTRUCTURE PHYSICS
Halle (Saale), Germany.
- February 17
2020** “Skyrmion Crystals as Topological Magnonics Platforms”
KARLSRUHE INSTITUTE OF TECHNOLOGY (KIT)
Karlsruhe, Germany.
- September 30 -
October 3
2019** “Skyrmion Crystals as Topological Magnonic Platforms”
Topomagnetism is Coming, Young Research Leaders Group Workshop,
JGU HELMHOLTZ-INSTITUT
Mainz, Germany.
- May 14
2019** “Topological Magnons and Edge States in Antiferromagnetic Skyrmion Crystals”
UNIVERSITY OF BASEL
Basel, Switzerland.
- April 3
2019** “Magnon Transport and Magnonic Topological Insulators”
DPG Spring Meeting
Regensburg, Germany.
- February 6 - 8
2019** “Topological Magnons and Edge States in Antiferromagnetic Skyrmion Crystals”
QSIT General Meeting
Arosa, Switzerland.
- October 9
2018** “Skyrmion Crystals as Topological Magnonics Platforms”
CENTER FOR QUANTUM SPINTRONICS (QUSPIN), NTNU
Trondheim, Norway.
- October 30
2017** “Magnetic Skyrmions: Quantum Nucleation and Current-Driven Dynamics”
Condensed Matter Physics Seminar
FACULTAD DE CIENCIAS FÍSICAS Y MATEMÁTICAS, UNIVERSIDAD DE CHILE
Santiago, Chile.
- September 8
2016** “Searching for novel noise signatures in transport measurements of magnetic skyrmions”
CNLS Student Seminar
LOS ALAMOS NATIONAL LABORATORY
Los Alamos, NM, USA.

CONTRIBUTED TALKS

- April 26 - 30
2021** “Spin Wave Radiation by a Topological Charge Dipole”
INTERMAG 2021
Virtual Conference.
- April 15 - 20
2021** “Majorana Bound States Induced by Antiferromagnetic Skyrmion Textures”
Korrelationstage 2021
Virtual Workshop.
- March 15 - 19
2021** “Chiral Hinge Magnons in Second-Order Topological Magnon Insulators”
2021 American Physical Society March Meeting
ONLINE.
- November 2 - 6
2020** “Magnonic Quadrupole Topological Insulator in Antiskyrmion Crystals”
2020 Magnetism and Magnetic Materials Conference
Palm Beach, FL, USA.

- March 2 2020** “Chiral Magnonic Edge States in Ferromagnetic Skyrmion Crystals Controlled by Magnetic Fields”
Mini March Meeting – Spintronics, Magnetism, and Magnetic Materials
Riverside, CA, USA.
- September 17 - 19 2019** “Topological Magnons and Edge States in Antiferromagnetic Skyrmion Crystals”
Skyrmionics Workshop For Young Researcher
JGU MITP,
Mainz, Germany.
- August 29 2019** “Topological Magnons and Edge States in Antiferromagnetic Skyrmion Crystals”
Joint Annual Meeting SPS and ÖPG 2019
Zürich, Switzerland.
- July 28 - August 1 2019** “Topological Magnons and Edge States in Antiferromagnetic Skyrmion Crystals”
Magnonics 2019
Carovigno, Italy.
- June 24 - 28 2019** “Topological Magnons and Edge States in Antiferromagnetic Skyrmion Crystals”
Sol-SkyMag 2019
San Sebastian, Spain.
- March 13 - 17 2017** “Noise Fluctuations and Avalanche Statistics of Skyrmions with Quenched Disorder”
2017 American Physical Society March Meeting
New Orleans, LA, USA.
- March 14 - 18 2016** “Controlling skyrmion helicity via engineered Dzyaloshinskii-Moriya interactions”
2016 American Physical Society March Meeting
Baltimore, MD, USA.
- January 11 - 15 2016** “Skyrmion Nucleation via Localized Magnetic Fields”
13th Joint MMM-Intermag Conference
San Diego, CA, USA.

RECOGNITION & AWARDS

- 2010 - 2013 International Fulbright Science and Technology Award** Ph.D. scholarship awarded to a single applicant per country
THE BUREAU OF EDUCATIONAL AND CULTURAL AFFAIRS
OF THE U.S. DEPARTMENT OF STATE
- 2009 - 2010 Master's Degree Fellowship** Awarded to the top 3 applicants at the national level
CONICYT (Chilean Science and Technology National Research Committee)
- 2004 - 2007 Outstanding Student Recognition** Awarded to students with grades in the top 6%
Facultad de Ciencias Físicas y Matemáticas, UNIVERSIDAD DE CHILE
- 2004 - 2009 Academic Excellence Scholarship** Second highest score in the 2003 national university admission process
Full college tuition coverage
EL MERCURIO S.A.P.

OUTREACH

- December 14 - 20 2013** “COACH-A-TEACHER” PROGRAM
Workshops, lectures, and demonstrations for high school teachers and students.
Santiago, Chile.

RESEARCH EXPERIENCE & EDUCATION

- Postdoctoral Associate** UNIVERSITY OF DUISBURG-ESSEN, 2021 - present
Group of Prof. Dr. Karin Everschor-Sitte
- Postdoctoral Associate** JOHANNES GUTENBERG UNIVERSITY MAINZ, 2020 - 2021
Group of Prof. Dr. Karin Everschor-Sitte
- Postdoctoral Associate** UNIVERSITY OF BASEL, 2017 - 2020
Group of Prof. Dr. Daniel Loss
- Ph.D., Physics** UNIVERSITY OF CALIFORNIA, SAN DIEGO, 2017
Supervisor: Prof. Daniel Arovas
Dissertation: *"Toward Magnetic Skyrmion Manipulation"*
- Graduate Student Internship** LOS ALAMOS NATIONAL LABORATORY, June - December 2016
Mentors: Dr. Cynthia J. O. Reichhardt, Dr. Charles Reichhardt, and Dr. Avadh Saxena
- M.S., Physics** UNIVERSIDAD DE CHILE, 2010
Supervisor: Prof. Álvaro Núñez
Thesis: *"Controlling spin interactions with electric currents"*
- B.S., Physics** UNIVERSIDAD DE CHILE, 2008

TECHNIQUES & SKILLS

- Theoretical** Holstein-Primakoff Method
Collective Coordinates
Stochastic Ordinary Differential Equations
Instantons
Keldysh Formalism
Path Integrals
Spin Coherent States
- Computer Simulations** Atomistic Spin Simulations
Monte Carlo Methods
Molecular Dynamics
Stochastic Ordinary Differential Equations
- Programing and Software** C
C++
Mathematica
L^AT_EX
Adobe Illustrator

CONFERENCES/WORKSHOPS/SCHOOLS

- February 9 - 18 2021** *1st Joint Workshop of CRC 1242 & TRR 227*
Exciting Dynamics: How electrons, spins, and phonons interact
Poster: *"Spin Wave Radiation by a Topological Charge Dipole"*

- December 7 - 11 2020** *Joint European Magnetic Symposia*
Lisbon, Portugal.
Poster: "Spin Wave Radiation by a Topological Charge Dipole"
- February 5 - 7 2020** *QSIT General Meeting*
Arosa, Switzerland.
Poster: "Skyrmion Crystals as Topological Magnonics Platforms"
- December 1 - 5 2019** *Skyrmions in Magnetic Materials, British-German WE-Heraeus-Seminar*
Bad Honnef, Germany.
Poster: "Skyrmion Crystals as Topological Magnonics Platforms"
- October 4 - 5 2018** *Quantum Spintronics 2018*
Trondheim, Norway.
- September 3 - 7 2018** *Joint European Magnetic Symposia*
Mainz, Germany.
Poster: "Magnetic Skyrmion Avalanches"
- November 4 - 8 2013** *58th Annual Conference on Magnetism and Magnetic Materials*
Denver, CO, USA.
- March 18 - 22 2013** *2013 American Physical Society March Meeting*
Baltimore, MD, USA.
- July 6 - 24 2009** *Summer College on Non-equilibrium Physics from Classical to Quantum Low Dimensional Systems*
THE ABDUS SALAM INTERNATIONAL CENTRE FOR THEORETICAL PHYSICS,
Trieste, Italy.
- January 6 - 9 2009** *II Escuela de Nanoestructuras (Summer School on Nanostructures)*
UNIVERSIDAD TÉCNICA FEDERICO SANTA MARÍA,
Valparaíso, Chile.
- January 4 - 6 2009** *Workshop on Decoherence, Correlations and Spin Effects in Nanostructured Materials (MWN/CIAM),*
Viña del Mar, Chile.
Poster: "Slave boson method applied to a two sites chain coupled to reservoirs"
- December 9 - 12 2008** *At the Frontiers of Condensed Matter IV (Current Trends and Novel Materials)*
Buenos Aires, Argentina.
Poster: "Shot noise and charge fluctuations in a double quantum dot chain"
- November 12 - 14 2008** *XVI Simposio Chileno de Física*
Valparaíso, Chile.
Poster: "Shot noise and charge fluctuations in a double quantum dot chain"

TEACHING EXPERIENCE

- 2018 - 2020** TEACHING ASSISTANT,
Undergraduate and Graduate Physics Courses,
Department of Physics, University of Basel
- 2013 - 2017** TEACHING ASSISTANT,
Undergraduate and Graduate Physics Courses,
Department of Physics, University of California, San Diego
- Spring 2016** INSTRUCTOR OF RECORD,
Physics 1 Series Labs,
Department of Physics, University of California, San Diego

2006 - 2008 TEACHING ASSISTANT,
Undergraduate Physics Courses,
Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile

Summer 2006 & 2007 TEACHING ASSISTANT,
Física I, Escuela de Verano (Physics Summer Course for high school students),
Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile

PROFESSIONAL SOCIETIES

- American Physical Society (member)

PERSONAL REFERENCES

Prof. Dr. Karin Everschor-Sitte Faculty of Physics,
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Prof. Dr. Daniel Loss Department of Physics,
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