Lea Ferreira dos Santos

Department of Physics
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RESEARCH INTERESTS: many-body quantum systems, non-equilibrium quantum dynamics, thermalization, quantum chaos, spin systems, many-body localization, quantum phase transition, quantum transport, quantum control, decoherence, quantum-classical correspondence.

EDUCATION:

1997 - 2000 **Degree: PhD in Theoretical Physics**
University of São Paulo
Thesis advisor: Professor Carlos O. Escobar, title: "Aspects of Foundations of Quantum Mechanics: Stochastic Processes and Analogy with Turbulence".

1995 - 1996 **Visiting PhD Student**
Auckland University, Department of Physics
Research performed with Professor Dan Walls: light scattering from Bose Einstein condensates.

1992 - 1994 **Degree: MSc in Theoretical Physics**
University of São Paulo
Thesis advisor: Professor Carlos O. Escobar, title: "Studies of Dissipative Effects in the Quantum Limit of Weber Antennas".

1988-1991 **Degree: BSc in Physics**
University of São Paulo

ACADEMIC POSITIONS:

2014 - **Professor** (Chair since 2016)
Yeshiva University, Department of Physics

2013 - 2014 **Associate Professor**
Yeshiva University, Department of Physics

2007 - 2013 **Assistant Professor**
Yeshiva University, Department of Physics

2004 - 2007 **Research Associate**
Dartmouth College, Department of Physics
Research performed with Professor Lorenza Viola

2002 - 2004 **Research Associate**
Michigan State University, Department of Physics
Research performed with Professor Mark I Dykman

2000 - 2001 **Postdoctoral Fellow**
Yale University, Department of Physics
Research performed with Professor Dimitri Kusnezov

EDITORIAL BOARDS:

2021 - Physical Review E
2020 - 2021 New Journal of Physics

GRANTS:

NSF (2021-2024)	"CCI Phase I: NSF Center for Quantum Dynamics on Modular Quantum Devices" (CHE - 2124511)
NSF (2020-2022)	"Nonequilibrium Quantum Matter: Timescales and Self-Averaging" (DMR - 1936006)
NSF (2017-2020)	"Physics of Interacting Quantum Systems with Phase Transitions" (DMR - 1603418)
NSF (2012-2017)	"CAREER: Studies of Dynamics and Control of Quantum Many-Body Systems Far from Equilibrium" (DMR-1147430)
NSF (2012-2017)	"KI-net: kinetic description of emerging challenges in multiscale problems of natural sciences" (DMS-1107444) Research Network Proposal
Research Corporation (2009-2010)	Cottrell College Science Award: Transport Properties and Control in Low-Dimensional Quantum Many-Body Systems

AWARDS and HONORS:

2021	Simons Fellow in Theoretical Physics
2017	Outstanding Referee for the American Physical Society
2015	Cottrell Scholar
2015	Invitation for a supported 3-month visit to the ITAMP at Harvard
2012-2017	NSF CAREER Award
2010	Dean Karen Bacon Award for an Outstanding Junior Faculty Member
2009-2012	KITP Scholar
2009-2010	Cottrell College Science Award
2008	Member of the U.S. delegation to the "3rd IUPAP International Conference on Women in Physics"
2000-2001	Fellowship for postdoctoral position at Yale University: Fundação de Amparo à Pesquisa do Estado de São Paulo – FAPESP.
1997-2000	Fellowship for PhD program: Conselho Nacional de Desenvolvimento Científico e Tecnológico – CNPq.
1995-1996	New Zealand Official Development Assistance (NZODA) Study Award for PhD program at Auckland University.

RESEARCH MENTORSHIP

Postdoctoral fellows:

- Talía L. M. Lezama (2021-present)
- Mauro Schiulaz (2018-2019). Editor for PRX.
- Marco Távora (2015 - 2016). Co-founder of a consulting company.
- Eduardo Jonathan Torres Herrera (2012 - 2014). Physics Professor in Mexico.
- Manan Vyas (2013). Physics Professor in Mexico.

Graduate students:

- Nahum Sá (2020 - current)

[co-advised with Itzhak Roditi, CBPF, Brazil.]

- David Zarate-Herrada (2019 - current)

[co-advised with Jonathan Torres, BUAP, Mexico.]

- David Villaseñor (2019 - current)

[co-advised with Jorge Hirsch, UNAM, Mexico.]

- Karin Wittmann Wilsmann (2018 - current)

[co-advised with Angela Foerster, UFRGS, Brazil.]

- Jorge Chávez-Carlos (2016 - 2019)

[co-advised with Jorge Hirsch, UNAM, Mexico.]

- Mohamad Nikman (2016 - 2018)

[co-advised with David Cory, University of Waterloo, Canada.]

- Pablo Zangara (2012 - 2013)

[co-advised with Horacio Pastawski, Universidad Nacional de Cordoba, Argentina.]

Undergraduate students:

31 students: 23 female undergraduates from Stern College, 1 female undergraduate from Ben Gurion University, 1 female undergraduate from Dartmouth College, 3 male students from Yeshiva College, 1 male student from the Indian Institute of Technology Kanpur, 1 male student from the UNAM, 1 male student from Queens College.

KRESSEL SCHOLARS & HONOR THESES:

- Tamar Leiser (2021-2022) [physical science major, March Meeting, 2022]
- Jonathan Karp (2015-2017) [physics major, 1 publication, March Meeting, 2017]
- Davida Kollmar (2012-2013) [physics major, 2 publications, March Meeting, 2013]
- Kira Joel (2012-2013) [physics major, 1 publication, March Meeting, 2013]
- Aviva Gubin (2011-2012) [physics major, 1 publication, March Meeting, 2012]

HONOR THESES:

- Chemda Wiener (2020-2021) [computer science major, March Meeting, 2021]
- Miriam Baitner (2019-2020) [physical science major, March Meeting, 2020]
- Tamar Felman (2016-2017) [physical science major]
- Elisheva Elbaz (2015-2016) [pre-engineering major]
- Ayelet Friedman (2012-2013) [math major]
- Julie Dinerman (2009-2010) [physics and math major, 1 publication, March Meeting, 2010]

- Shoshana Gilbert (2009-2010) [biology major]

SUMMER & LONG-TERM STUDENTS:

- Yael Lebel (2021) [physics major, Ben Gurion University]
- Leon Alper (2021) [physics major, March Meeting, 2022]
- Eliana Feifel (2019, 2020) [math major, March Meeting, 2021]
- Jechiel Van Dijk (2020) [physics major]
- Saúl Pilatowsky-Cameo (2019-2020) [physics major, UNAM, talk in Prague]
- Bar Alluf (2018-2019) [physics major]
- Aviva Shooman (2018) [pre-engineering, March Meeting & Scientista Symposium, 2019]
- Shira Siegel (2017-2018) [physical science major]
- Connie H. Jiang (2015) [physics, Dartmouth College]
- Yonina Loskove (2015) [biology major]
- Ajesh Kumar (2015) [physics, Indian Institute of Technology Kanpur]
- Rebecca Peyser (2013-2014) [pre-engineering]
- Judy Alper (2013) [physics major]
- Aviva Schiffmiller (2010) [biology major]
- Rebecca Segal (2009) [physics major]
- Frieda Dukesz (2008-2009) [chemistry major, 1 publication, March Meeting, 2009]
- Robin F. Burger (2008) [biology major]
- Marina Zilbergerts (2008) [biology major, 1 publication]
- Davida Cohen (2008) [biology major]

High school students: *(2 female students)*

- Elisheva Sprung (2013). She later studied engineering at Stony Brook University.
- Zoe Rothstein (2012). She later became a computer science student at the MIT.

TEACHING EXPERIENCE:

YESHIVA UNIVERSITY

2 undergraduate courses per semester (8 hours/week)

Introductory Physics I and II	These courses have a high percentage of pre-med students. All the slides and problems to be solved in class are handed in to the students on the first day of class. YouTube videos with solutions of the problems are provided. After every 10-20 minutes of theory, there are assessing problems solved individually or in groups. Student-student interaction is motivated. Demonstrations, short videos, curiosities about the scientists involved in the subject studied and their historical moments are also presented.
General Physics I and II	Calculus based physics course. Strategies like those from the Introductory Physics I and II courses above are implemented. Some of the problems are solved numerically.

Computational Methods in Scientific Research	This course was prepared from scratch and designed primarily for science, math, and pre-engineering students. It is entirely hands-on. Students learn how to program, get and analyze data, visualize results with graphics and animations.
Modern Physics	Quantum mechanics and special relativity are put in historical context. There are movies, games, and various activities that stress student-student interaction. Notions of computational methods are introduced and some of the assignments are solved numerically.
Quantum Mechanics	Students solve assignments that include analytical and also numerical problems. As part of the evaluation, they are required to give a 20-minute oral presentation on a topic of current research interest.
Solid State Physics	Students are introduced to condensed matter physics, they solve numerical assignments, and choose a topic for a 20-minute oral presentation.

DARTMOUTH COLLEGE
Substituted instructor in undergraduate and graduate courses in Quantum Mechanics and Quantum Information Science. Attended workshops on "The Art of Teaching Undergraduates" (2005-2006)
MICHIGAN STATE UNIVERSITY
Substituted instructor in undergraduate and graduate courses on Statistical Mechanics and Thermodynamics (2003-2004).

COMMITTEE SERVICES and SYNERGISTIC ACTIVITIES:

EXTERNAL:

- Referee for Science, Science Advances, Nature Physics, Nature Communication, Physical Review Letters, Physical Review A, B, E, and X, New Journal of Physics, Annals of Physics, Annalen der Physik, Europhysics Letters, Journal of Optics B, Physics Letters A, Journal of Physics A, Journal of Physics B, Physica Scripta, Philosophical Magazine, Chaos, Journal of Statistical Mechanics, Journal of Statistical Physics, American Journal of Physics, Quantum Information Processing, Foundations of Physics, Proceedings of the Royal Society, SciPost Physics, Entropy.
- Referee for the National Science Foundation, Research Corporation, German Research Foundation, the Netherlands Organization for Scientific Research, Austrian Academy of Sciences, Israel Science Foundation, Swiss National Science Foundation.
- Member of the American Physical Society, International Association of Mathematical Physics, American Association of Physics Teachers, ANACAPA Society.
- APS Metropolis Award Selection Committee.
- Meetings of the ANACAPA Society, which promotes research in physics at primarily undergraduate institutions.
- American Physical Society LeRoy Apker Award selection committee for outstanding research by undergraduates (2011-2013).
- Evaluated project of scientific development for university in the Amazon Region in Brazil.

- Tutorials and summer courses about many-body quantum dynamics in South Africa, Turkey, Mexico, France, and the Czech Republic.
- PhD thesis committees in Italy and Australia.
- Chair of the Nominating Committee of the Forum of Physics and Society of the American Physical Society (2010, 2013).
- Member-at-Large of the Executive Committee of the Forum of Physics and Society of the American Physical Society (2010-2012).
- Scientific committee of summer school in Turkey (2014, 2016)
- Organizer of workshops in Brazil (2008, 2016), South Korea (2018), the Simons Center at Stony Brook (2019), Mexico (2019, 2021).

INTERNAL:

- Efforts to expand the Computer Science department.
- Physics Colloquium.
- Executive Committee of the Division of Natural Sciences and Mathematics.
- Academic Standards Committee for Stern College for Women.
- Organizer of open houses and major fairs. Interviewer for the Honors Program.
- Expansion of the physics section of the library.
- Curriculum development. Advisor of pre-engineering students.
- Restructuring of the Physics, Physical Science, and Pre-Engineering majors.
- Assessment Statements and Rubrics for the Physics Department.
- Sunday of hands on Science: taught computational tools to visiting high school students.
- Creation of the Physics Club at Stern College for Women.
- Student Science Club Speakers Budget Committee.
- Events about computer languages for science, math and computer science students at Stern College for Women.

WOMEN IN PHYSICS:

- Research projects with 25 female undergraduates and 2 female high school students.
- Mentored 4 students from the Jewish Foundation for the Education of Women (JFEW) fellowship.
- Visited high schools for girls to talk about careers in physics. Prepared presentations on "Why study physics" for Open Houses and Major Fairs at Stern College for Women.
- Supported 9 female undergraduate students to give oral presentations at the APS March Meetings. Helped student with application for child-care support from the APS.
- Sent students to the APS Conferences for Undergraduate Women in Physics.
- Obtained the NSF Travel Grant for Women Speakers that covers the expenses of female professors who give talks at Stern College for Women. Organized recruiting visits of chairs from research universities to talk at Stern College for Women.
- Wrote the article "*Science for All"* which appeared in the Gazette - the Newsletter of the Committee on the Status of Women in Physics of the American Physical Society (2009).
- Co-authored the U.S. delegation paper "*Women in Physics in the United States"* for the proceedings of the 3rd IUPAP International Conference on Women in Physics (2008).

PUBLICATIONS [**h-index 41**: Google Scholar]

2021

102) *Identification of quantum scars via phase-space localization measures*, Saúl Pilatowsky-Cameo, David Villaseñor, Miguel A. Bastarrachea-Magnani, Sergio Lerma-Hernández, Lea F. Santos, Jorge G. Hirsch, arXiv: 2107.06894

101) *Quantum-classical correspondence of a system of interacting bosons in a triple-well potential*
ER Castro, J Chávez-Carlos, I Roditi, LF Santos, JG Hirsch
Quantum **5**, 563 (2021)

100) *Heating suppression by long-range interactions in periodically driven spin chains*
Devendra Singh Bhakuni, Lea F. Santos, and Yevgeny Bar Lev
Physical Review B **104**, L140301 (2021)

99) *Probing the edge between integrability and quantum chaos in interacting few-atom systems*
Thomás Fogarty, Miguel Angel Garcia-March, Lea F. Santos, N.L. Harshman
Quantum **5**, 486 (2021)

98) *Equilibration time in many-body quantum systems*
TLM Lezama, EJ Torres-Herrera, F Pérez-Bernal, YB Lev, Lea F Santos
Physical Review B **104**, 085117 (2021)

97) *Multifractality and self-averaging at the many-body localization transition*
A Solórzano, Lea F Santos, EJ Torres-Herrera
Physical Review Research **3**, L032030 (2021)

96) *How many particles make up a chaotic many-body quantum system?*
G Zisling, LF Santos, YB Lev
SciPost Physics **10**, 088 (2021)

95) Lea F Santos
The quick drive to pseudo-equilibrium
Nature Physics **17**, 429 (2021)

94) S Pilatowsky-Cameo, D Villaseñor, MA Bastarrachea-Magnani, Sergio Lerma-Hernández, Lea F Santos, Jorge G Hirsch
Ubiquitous quantum scarring does not prevent ergodicity
Nature Communications **12**, 852 (2021)

93) M Niknam, Lea F Santos, DG Cory
Experimental Detection of the Correlation Rényi Entropy in the Central Spin Model
Physical Review Letters **27**, 080401 (2021)

92) Y Liu, Lea F Santos, E Prodan
Topological Gaps in Quasi-Periodic Spin Chains: A Numerical and K-Theoretic Analysis
arXiv:2009.03752

91) S Pilatowsky-Cameo, D Villaseñor, MA Bastarrachea-Magnani, Sergio Lerma-Hernández, Lea F Santos, Jorge G Hirsch
Quantum scarring in a spin-boson system: fundamental families of periodic orbits
New Journal of Physics, **23** 033045 (2021)

2020

90) EJ Torres-Herrera, I Vallejo-Fabila, AJ Martínez-Mendoza, Lea F Santos
Self-averaging in many-body quantum systems out of equilibrium: Time dependence of distributions
Physical Review E **102**, 062126 (2020)

89) Lea F Santos, F Pérez-Bernal, EJ Torres-Herrera

Speck of chaos
Physical Review Research **2**, 043034 (2020)
88) EJ Torres-Herrera, G De Tomasi, M Schiulaz, F Pérez-Bernal, LF Santos
Self-averaging in many-body quantum systems out of equilibrium: Approach to the localized phase
Physical Review B **102**, 094310 (2020).
87) M Schiulaz, EJ Torres-Herrera, F Pérez-Bernal, LF Santos
Self-averaging in many-body quantum systems out of equilibrium: Chaotic Systems
Physical Review B **101**, 174312 (2020).
86) D Villasenor, S Pilatowsky-Cameo, MA Bastarrachea-Magnani, Sergio Lerma-Hernández, Lea F Santos, Jorge G Hirsch
Quantum vs classical dynamics in a spin-boson system: manifestations of spectral correlations and scarring
New Journal of Physics **22**, 063036 (2020)
85) EJ Torres-Herrera, LF Santos
Dynamical Detection of Level Repulsion in the One-Particle Aubry-André Model
Condensed Matter 5, 7 (2020) [in memory of Shmuel Fishman]
84) S Pilatowsky-Cameo, J Chávez-Carlos, MA Bastarrachea-Magnani, Pavel Stránský, Sergio Lerma-Hernández, Lea F Santos, Jorge G Hirsch
Positive quantum Lyapunov exponents in experimental systems with a regular classical limit
Physical Review E 101, 010202 (R) (2020)
83) M Niknam, LF Santos, DG Cory
Sensitivity of quantum information to environment perturbations measured with a nonlocal out-of-time-order correlation function,
Physical Review R **2**, 013200 (2020)

2019

82) J Khalouf-Rivera, M Carvajal, LF Santos, F Pérez-Bernal
Calculation of Transition State Energies in the HCN–HNC Isomerization with an Algebraic Model
The Journal of Physical Chemistry A **123**, 9544 (2019)
81) EJ Torres-Herrera, JA Méndez-Bermúdez, LF Santos
Level repulsion and dynamics in the finite one-dimensional Anderson model
Physical Review E 100, 022142 (2019)
80) S Lerma-Hernández, D Villaseñor, MA Bastarrachea-Magnani, EJ Torres-Herrera, LF Santos, JG Hirsch
Dynamical signatures of quantum chaos and relaxation time scales in a spin-boson system
Physical Review E **100**, 012218 (2019)
79) F Borgonovi, FM Izrailev, LF Santos,
Timescales in the quench dynamics of many-body quantum systems: Participation ratio vs out-of-time ordered correlator,
Physical Review E **99**, 052143 (2019)
78) M. Schiulaz, E. J. Torres-Herrera, L. F. Santos,
Thouless and relaxation time scales in many-body quantum systems,
Physical Review B **99**, 174313 (2019)
77) J Chávez-Carlos, B López-del-Carpio, MA Bastarrachea-Magnani, Pavel Stránský, Sergio Lerma-Hernández, Lea F Santos, Jorge G Hirsch,

Quantum and classical Lyapunov exponents in atom-field interaction systems
Physical Review Letters **122**, 024101 (2019)
76) F. Borgonovi, F. M. Izrailev, L. F. Santos,
Exponentially fast dynamics in chaotic many-body systems
Physical Review E **99**, 010101 (R) (2019)
75) E. J. Torres-Herrera, L. F. Santos,
Signatures of chaos and thermalization in the dynamics of many-body quantum systems
European Physical Journal Special Topics **227**, 1897 (2019)

2018

74) M. A. Garcia-March, S. van Frank, M. Bonneau, J. Schmiedmayer, M. Lewenstein, and L. F. Santos,
Relaxation, chaos, and thermalization in a three-mode many-body model of a BEC
New Journal of Physics **20**, 113039 (2018)
73) M. Schiulaz, M. Távora, L. F. Santos,
From few- to many-body quantum systems
Quantum Science and Technology **3**, 044006 (2018)
72) R. Mondaini, K. Mallayya, L. F. Santos, M. Rigol,
Comment on "Systematic Construction of Counterexamples to the Eigenstate Thermalization Hypothesis"
Physical Review Letters **121**, 038901 (2018)
71) S. Lerma-Hernández, J. Chávez-Carlos, M. A. Bastarrachea-Magnani, L. F. Santos, J. G. Hirsch,
Analytical description of the survival probability of coherent states in regular regimes
Journal of Physics A **51**, 475302 (2018)
70) A. del Campo, J. M. Vilaplana, L. F. Santos, J Sonner,
Decay of a Thermofield-Double State in Chaotic Quantum Systems
European Physical Journal Special Topics **227**, 247 (2018)
69) E. J. Torres-Herrera, A. García-García, L. F. Santos,
Generic dynamical features of quenched interacting quantum systems: survival probability, density imbalance and out-of-time-ordered correlator
Physical Review B **97**, 060303(R) (2018)

2017

68) E. J. Torres-Herrera, L. F. Santos,
Dynamical Manifestations of Quantum Chaos: Correlation Hole and Bulge,
Philosophical Transactions of the Royal Society of London A **375**, 20160434 (2017)
67) Jaime L. C. da C. Filho, Andreia Saguia, Lea F. Santos, Marcelo S. Sarandy,
Many-body localization transition through pairwise correlations,
Physical Review B **96**, 014204 (2017)
66) E. J. Torres-Herrera and L. F. Santos,
Extended nonergodic states in disordered many-body quantum systems
Annalen der Physik **529**, 1600284 (2017)
65) M. Sindelka, L. F. Santos, N. Moiseyev
Excited-state quantum phase transitions studied from a non-Hermitian perspective,
Physical Review A **95**, 010103(R) (2017)
64) F. Pérez-Bernal and L. F. Santos,
Effects of excited state quantum phase transitions on system dynamics,

Fortschritte der Physik, **65**, 1600035 (2017)
63) M. Távora, E. J. Torres-Herrera, L. F. Santos,
Power-law Decay Exponents: a Dynamical Criterion for Predicting Thermalization,
Physical Review A **95**, 103604 (2017)

2016

62) M. Távora, E. J. Torres-Herrera, L. F. Santos,
Inevitable power-law behavior of isolated many-body quantum systems and how it anticipates thermalization,
Physical Review A **94**, 041603R (2016)
61) E. J. Torres-Herrera, J. Karp, M. Távora, and L. F. Santos,
Realistic many-body quantum systems vs full random matrices: static and dynamical properties,
Entropy **18**, 359 (2016)
60) L. F. Santos, M. Távora, F. Pérez-Bernal,
Excited state quantum phase transitions in many-body systems with infinite-range interaction: localization, dynamics, and bifurcation,
Physical Review A **94**, 012113 (2016)
59) F. Borgonovi, L. F. Santos, F. M. Izrailev, V. G. Zelevisnky,
Quantum chaos and thermalization in isolated systems of interacting particles,
Physics Reports **626**, 1 (2016)
58) L. F. Santos, F. Borgonovi, G. L. Celardo,
Cooperative shielding in many-body systems with long-range interaction: localization and light cone,
Physical Review Letters **116**, 250402 (2016)
57) E. J. Torres-Herrera, M. Tavora, and L. F. Santos,
Survival Probability of the Néel State in Clean and Disordered Systems: an Overview
B. J. Phys. **46**, 239 (2016)

2015

56) L. F. Santos and F. Pérez-Bernal,
Structure of eigenstates and quench dynamics at an excited state quantum phase transition
Physical Review A **92**, 050101R (2015)
55) E. J. Torres-Herrera and L. F. Santos,
Dynamics at the Many-Body Localization Transition
Physical Review B **92**, 014208 (2015)
54) E. J. Torres-Herrera, Davida Kollmar, and L. F. Santos,
Relaxation and Thermalization of Isolated Many-Body Quantum Systems
Physica Scripta **T165**, 014018 (2015)

2014

53) E. J. Torres-Herrera and L. F. Santos,
Non-Exponential Fidelity Decay in Isolated Interacting Quantum Systems,
Physical Review A **90**, 033623 (2014)
52) E. J. Torres-Herrera and L. F. Santos,
Local quenches with global effects in interacting quantum systems
Physical Review *E* **89**, 062110 (2014)
51) E. J. Torres-Herrera, M. Vyas, and L. F. Santos,
General Features of the Relaxation Dynamics of Interacting Quantum Systems
New Journal of Physics **16**, 063010 (2014)

50) E. J. Torres-Herrera and L. F. Santos,
Quench Dynamics of Isolated Many-Body Quantum Systems
Physical Review A **89**, 043620 (2014)

2013

49) E. J. Torres-Herrera and L. F. Santos,
Effects of the interplay between initial state and Hamiltonian on the thermalization of isolated quantum many-body systems
Physical Review E **88**, 042121 (2013).
48a) P. R. Zangara, A. D. Dente, E. J. Torres-Herrera, H. M. Pastawski, A. Iucci, and L. F. Santos,
Time Fluctuations in Isolated Quantum Systems of Interacting Particles
Physical Review E **88**, 032913 (2013).
48b) P. R. Zangara, A. D. Dente, E. J. Torres-Herrera, H. M. Pastawski, A. Iucci, and L. F. Santos,
Erratum: Time Fluctuations in Isolated Quantum Systems of Interacting Particles,
Physical Review E **87,** 029904 (2013)
47) K. He, L. F. Santos, T. M. Wrigth, and M. Rigol,
Single-particle and many-body analyses of a quasi-disordered integrable system after a quench,
Physical Review A **87**, 063637 (2013)
46) K. Joel, D. Kollmar, and L. F. Santos,
An introduction to the spectrum and dynamics of Heisenberg spins-1/2 chains
American Journal of Physics **81**, 450 (2013)

2012

45) L. F. Santos and M. I. Dykman,
Quantum interference-induced stability of repulsively bound pairs of excitations
New Journal of Physics **14**, 095019 (2012)
44) L. F. Santos and M. Rigol,
Fluctuations in the delocalization level of eigenstates and thermalization
Physica Scripta **T151**, 014033 (2012)
43) L. F. Santos, A. Polkovnikov, and M. Rigol,
Weak and strong canonical typicality in quantum systems,
Physical Review E **86**, 010102R (2012)
42) L. F. Santos, F. Borgonovi and F. M. Izrailev
Onset of chaos and relaxation in isolated systems of interacting spins: Energy shell approach
Physical Review E **85**, 036209 (2012).
41) L. F. Santos, F. Borgonovi and F. M. Izrailev,
Chaos and statistical relaxation in quantum systems of interacting particle,
Physical Review Letters **108**, 094102 (2012).
40) A. Gubin and L. F. Santos
Quantum chaos: an introduction via chains of spins-1/2,
American Journal of Physics **80**, 246 (2012).

2011

39) L. F. Santos and A. Mitra
Domain wall dynamics in integrable and chaotic spin-1/2 chains,
Physical Review E **84**, 016206 (2011)
38) L. F. Santos, A. Polkovnikov, and M. Rigol

Entropy of isolated quantum systems after a quench,
Physical Review Letters **107**, 040601 (2011).

2010

37a) L. F. Santos and M. Rigol
Localization and the effects of symmetries in the thermalization properties of one-dimensional quantum systems,
Physical Review E **82**, 031130 (2010).
37b) L. F. Santos and M. Rigol,
Erratum: Localization and the effects of symmetries in the thermalization properties of one-dimensional quantum systems,
Physical Review E **87,** 029904 (2013)
36) M. Rigol and L. F. Santos
Quantum chaos and thermalization in gapped systems,
Physical Review A **82**, 011604R (2010).
35) J. Dinerman and L. F. Santos
Manipulation of the dynamics of many-body systems via quantum control methods,
New Journal of Physics **12**, 055025 (2010)
34) L. F. Santos and M. Rigol
Onset of Quantum Chaos in One-Dimensional Bosonic and Fermionic Systems and its Relation to Thermalization,
Physical Review E **81**, 036206 (2010).
33) L. F. Santos
Transport Behavior and Dynamical Control in Integrable and Chaotic Spin-1/2 Heisenberg Chains,
Journal of Physics: Conference Series **200**, 022053 (2010).

2009

32) L. F. Santos
Transport and Control in One-Dimensional Systems,
Journal of Mathematical Physics **50**, 9095211 (2009).
31) F. Dukesz, M. Zilbergerts, and L. F. Santos,
Interplay between Interaction and (Un)Correlated Disorder in Heisenberg Spin-1/2 Chains: Delocalization and Global Entanglement,
New Journal of Physics **11**, 043026 (2009).
30) L. Rego, L. F. Santos, and V. S. Batista
Coherent Control of Quantum Dynamics with Sequences of Unitary Phase-Kick Pulse,
Annual Review of Physical Chemistry **60,** 293 (2009).

2008

29) L. F. Santos
Transport Control in Low-Dimensional Spin-1/2 Heisenberg Systems,
Physical Review E **78**, 031125 (2008)
28) L. F. Santos and L. Viola
Advantages of Randomization in Coherent Quantum Dynamical Control,
New Journal of Physics **10**, 083009 (2008).
27) W. Z. Zhang, N. P. Konstantinidis, V.V. Dobrovitski, B.N. Harmon, L.F. Santos, and L. Viola,

Long-time electron spin storage via dynamical suppression of hyperfine-induced decoherence in a quantum dot,
Physical Review B **77**, 125336 (2008).
26) W. G. Brown, L. F. Santos, D. Starling, and L. Viola,
Quantum Chaos, Localization, and Entanglement in Disordered Heisenberg Models,
Physical Review E **77**, 021106 (2008).

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PUBLISHED BEFORE JOINING YESHIVA UNIVERSITY:
25) W. Zhang, V. V. Dobrovitski, L. F. Santos, L. Viola, and B. N. Harmon
Suppression of electron spin decoherence in a quantum dot,
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15) L. F. Santos and G. Rigolin,
Effects of the interplay between interaction and disorder in bipartite entanglement,
Physical Review A **71**, 032321 (2005).
14) L. F. Santos, M. I. Dykman, F. M. Izrailev, and M. Shapiro,
Strong many-particle localization and quantum computing with perpetually coupled qubits,
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13) L. F. Santos, G. Rigolin, and C. O. Escobar,

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12) L. F. Santos,
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Journal of Physics A **37**, 4723 (2004).
11) M. I. Dykman and L. F. Santos,
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Journal of Physics A **36**, L561 (2003).
10) L. F. Santos and M. I. Dykman,
Two-particle localization and antiresonance in disordered spin and qubit chains,
Physical Review B **68**, 214410 (2003).
9) L. F. Santos,
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8) L. F. Santos, Dimitri Kusnezov and Ph. Jacquod,
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Physical Review A **65**, 022106 (2001).
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5) L. F. Santos and C. O. Escobar
A proposed solution to the tail problem of dynamical reduction models,
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4) L. F. Santos and C. O. Escobar
Stochastic differential equations for the continuous spontaneous localization model,
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3) L. F. Santos and C. O. Escobar
Enhanced diffusion and the continuous spontaneous localization model,
Physical Review A **60**, 2712 (1999).
2) L. F. Santos and C. O. Escobar
Stochastic motion of an open bosonic string,
Physics Letters A **256**, 89 (1999).
1) C. O. Escobar, L. F. Santos and P. C. Marques F.
Quantum limits for the measurement on macroscopic bodies: a decoherence analysis,
Physical Review A **50**, 1913 (1994).

BOOK CHAPTERS:

2) L. F. Santos and E. J. Torres-Herrera
Book Chapter: *"Nonequilibrium many-body quantum dynamics: from full random matrices to real systems",*
[https://arxiv.org/abs/1803.06012]
in **Thermodynamics in the Quantum Regime - Fundamental Aspects and New Directions**
Editors Felix Binder, Luis A. Correa, Christian Gogolin, Janet Anders, and Gerardo Adesso

1) L. F. Santos and E. J. Torres-Herrera
Book Chapter: *"Nonequilibrium quantum dynamics of many-body systems",*
[https://arxiv.org/abs/1706.02031]
in **Chaotic, Fractional, and Complex Dynamics: New Insights and Perspectives**
Editors M. Edelman, E. E. N. Macau, M. A. F. Sanjuan (Springer, 2018)

PROCEEDINGS:

10) L. F. Santos and F. Pérez-Bernal
Excited-state quantum phase transitions in systems with many interacting spins-1/2
in **AIP Conference Proceedings,** Vol. 2150, 030005 (2019)
9) L. F. Santos and E. J. Torres-Herrera
Analytical expressions for the evolution of many-body quantum systems quenched far from equilibrium
in **AIP Conference Proceedings,** Vol. 1912, 020015 (2017)
edited by Pawel Danielewicz and Vladimir Zelevinsky
The Fifth Conference on Nuclei and Mesoscopic Physics
East Lansing, MI, United States 2017.
8) E. J. Torres-Herrera and L. F. Santos
Isolated many-body quantum systems far from equilibrium: Relaxation process and thermalization
in **AIP Conference Proceedings,** Vol. 1619, 171 (2014)
edited by Pawel Danielewicz, Alex Levchenko, Vladimir Zelevinsky, and Linna Leslie
The Fourth Conference on Nuclei and Mesoscopic Physics
East Lansing, MI, United States 2014.
7) L. F. Santos and M. Rigol
Relationship Between Chaos And Thermalization In One-Dimensional Quantum Many-Body Systems
in **Mathematical Results in Quantum Physics**
edited by Pavel Exner
QMath11 Mathematical Results in Quantum Physics Conference
Hradec Karlove, Czech Republic, September 2010.
6) L. F. Santos and C. O. Escobar
A Brief Discussion of Convergences in Interpretations of Quantum Mechanics
in **Quantum Theory: Reconsideration Of Foundations - 5** Vol. 1232 Pages: 45-52 (2010)
edited by AY Khrennikov
International Conference on Quantum Theory - Reconsideration of Foundations-5,
Växjö, Sweden, June, 2009.
5) Yevgeniya V. Zastavker, Paul Gueye, Kelly M. Mack, Rachel Ivie, Elizabeth H. Simmons, Lea F. Santos, Luz J. Martínez-Miranda, Arthur Bienenstock, Jacob Clark Blickenstaff, K. Renee Horton, and Beverly K. Hartlinek
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in **Women in Physics**, Vol. 1119,
edited by Beverly K. Hartline, K. Renee Horto, and Catherine M. Kaicher.
Proceeding of the 3rd IUPAP International Conference on Women in Physics,
Seoul, South Korea,October 2008.
4) M. I. Dykman, L. F. Santos, M. Shapiro, and F. M. Izrailev

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in **Nuclei and Mesoscopic Physics**, Vol. 777,
edited by Vladimir Zelevinsky.
Workshop on Nuclei and Mesoscopic Physics,
East Lansing, Michigan, USA, October 2004.
3) M. I. Dykman and L. F. Santos
How to localize excitations in a quantum computer with perpetually coupled qubits,
in **Noise and Information in Nanoelectronics, Sensors, and Standards II**, Vol. 5472, pp. 225-233, edited by J. M. Smulko, Y. Blanter, M. I. Dykman, and L. B. Kish.
Proceedings of the SPIE Second International Symposium on Fluctuations and Noise,
Gran Canaria Island, Spain, May 2004.
2) L. F. Santos and M. I. Dykman
Two-particle localization and antiresonance in disordered spin and qubit chains,
in **Noise and Information in Nanoelectronics, Sensors, and Standards II**,
edited by J. M. Smulko, Y. Blanter, M. I. Dykman, and L. B. Kish.
Proceedings of the SPIE Second International Symposium on Fluctuations and Noise,
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1) C. O. Escobar, L. F. Santos and P. C. Marques F.
Quantum limits for the measurement on macroscopic bodies: a decoherence analysis,
in **Particle Astrophysics, Atomic Physics and Gravitation,** pp. 473-477,
edited by J. Trân Thanh Vân, G. Fontaine, E. Hinds.
Proceedings of the XXIXth Rencontre de Moriond, Villars sur Ollon, Switzerland, March 1994.

INVITED TALKS SINCE 2015

2021

*) Sherbrooke University, Sherbrooke, Canada (Dec/01, 2021)
*) University of New Mexico, Albuquerque NM (Oct/21, 2021)
*) PROTOC 21: Probing Complex Quantum Dynamics through Out-of-time-ordered Correlators (Oct/11-15, 2021)
*) Online: QDT 2021: Quantum Thermodynamics Conference (Oct/04-08, 2021)
*) KITP (Santa Barbara, CA, Sep/05-17, 2021)
*) Wesleyan University (Middletown, CT, Sep/09, 2021)
*) Online: 2nd International Summer School on Advanced Quantum Mechanics (Prague, Czech Republic, Sep/2-11, 2021)
*) Online: FQMT 2021: Frontiers of Quantum and Mesoscopic Thermodynamics (Jul/18-24, 2021)
*) Online: University of Luxembourg (Luxembourg, Jun/29, 2021)
*) Online: Les Houches School in Computational Physics: "Dynamics of Complex Systems, from Theory to Computation" (April/12-23, 2021)
*) Online: Perimeter Institute (Waterloo, Canada, Mar/24, 2021)
*) Online: Jozef Stefan Institute and the Department of Physics of the University of Ljubljana (Mar/23, 2021)
*) Online: Ben Gurion University (Israel, Mar/22, 2021)
*) Online: Emory University (Atlanta, Feb/17, 2021)
*) Online: Instituto Técnico de Lisboa (Lisbon, Portugal, Feb/ 2021)
*) Online: The Royal Society (London, UK, Feb/8-11, 2021)
*) Online Workshop Ergodicity and chaos in many-body systems

(UNAM, Mexico, Feb/4-7, 2021)
*) Online: Universität Bielefeld (Germany, Jan/14, 2021)
2020
*) Online: Federal University of Rio Grande do Norte, Brazil (Dec/10, 2020)
*) Online: Wesleyan University, USA (Dec/02, 2020)
*) Online workshop on Chaos in many-body quantum systems, The Graduate Center of CUNY (Oct/02, 2020)
*) Online colloquium at the Federal University of São Carlos, Brazil (Sep/15, 2020)
*) Online: QChaos 2020 (Aug/13, 2020)
*) Online Workshop on Transport in 1d quantum-lattice models (Jul/10, 2020)
*) Colloquium at Emory University (Atlanta, GA, USA, Feb/18, 2020)
*) Workshop: Equilibration and Thermalization in Finite Quantum Systems (UNAM, Mexico, Jan/20-25, 2020)
2019
*) Workshop on Fluid phases of matter: From electron liquids to active matter (CUNY, USA, Dec/11-13, 2019)
*) Seminar at the University of Utah (Salt Lake City, UT, USA, Dec/03, 2019)
*) Thermalization, Many-Body-Localization and Generalized Hydrodynamics (ICTS, Bengaluru, India, Nov/11-29)
*) Universality and ergodicity in quantum many-body systems (Simons Center, Stony Brook, NY, USA Aug/26-Oct/18, 2019)
*) Conference: Out-of-equilibrium systems with long-range interactions (Natal, Brazil, Jul/15-19, 2019)
*) FQMT 2019: Frontiers of Quantum and Mesoscopic Thermodynamics (Prague, Czech Republic, Jul 15-19, 2019)
*) Summer Program: Active and Driven Matter: Connecting Quantum and Classical Systems (Aspen, CO, USA, Jun/09-30, 2019)
*) Workshop on "Quantum Dynamics and Control beyond Simple Models and Approximations (CUNY Graduate Center, NY, May/10, 2019)
*) Seminar at Northeastern University (Boston, MA, USA, Apr/03, 2019)
*) II Workshop on Quantum Information and Thermodynamics (Natal, Brazil, Mar/11-22, 2019)
*) Winter Program: 'Many-Body Quantum Chaos' (Aspen, CO, USA, Mar/10-15, 2019)
*) Conference on Nonequilibrium and transport in many-body systems (Rehovot, Israel, Jan/20-24, 2019)
*) Workshop: Equilibration and Thermalization in Finite Quantum Systems (UNAM, Mexico, Jan/15-18, 2019)
2018
*) Seminar at the National High Magnetic Field Laboratory (Florida State University, Dec/07, 2018)
*) Workshop Ergodicity Breaking in Many Body Systems (Natal, Brazil, Nov/12-23, 2018)
*) Colloquium at CCNY

(New York, NY, Oct/31, 2018)
*) Random Matrices, Integrability and Complex Systems
(Yad Hashmona, Israel, Oct/03-08, 2018)
*) Workshop Out-of-equilibrium dynamics in many-body systems
(Osnabrück, Germany, Sep/24-26, 2018)
*) The Dynamics of Quantum Information Program,
(Santa Barbara, California, Sep/10-21, 2018)
*) International Workshop Disordered Systems: From Localization to Thermalization and Topology
(Daejeon, South Korea, Sep/03-07, 2018) [Organizer]
*) ICMP2018: XIX International Congress on Mathematical Physics
(Montreal, Canada, Jul/22-28, 2018) [selected contribution]
*) Conference "Boris Chirikov, a pioneer of dynamical chaos"
(Cuernavaca, Mexico, Jun/11-15, 2018)
*) Workshop Quantum Phase Transitions in Nuclei and Many-body Systems
(Padova, Italy, May/22-25, 2018)
*) Xi'an Jiatong University
(Xi'an, China, May/03-09, 2018)
*) Workshop on Chaos and Dynamics in Correlated Quantum Matter
(Dresden, Germany, Mar/19-23, 2018)
*) Workshop on Quantum Many-Body Systems Far From Equilibrium
(Stellenbosch, South Africa, Mar/12-16, 2018)
*) Workshop: Equilibration and Thermalization in Finite Quantum Systems
(Mexico City, Mexico, Jan/15-19, 2018)

2017

*) Workshop: Progress in quantum collective phenomena - from MBL to black holes
(Simons Center, Stony Brook, NY, Nov/13-17, 2017)
*) Workshop "Quantum Thermodynamics"
(ITAMP, Harvard University, Cambridge, MA, Oct/30-Nov/01, 2017)
*) Workshop: Topological Dynamics: Quantum and Classical
(NJIT, Newark, NJ, Nov/06-08, 2017)
*) Workshop: Wonders of Broken Integrability
(Simons Center, Stony Brook, NY, Oct/02-06, 2017)
*) Quantum Innovators
(Waterloo, Canada, Oct/2-5, 2017)
*) 2nd Brazilian Meeting on Statistical Mechanics
(Ilheus, Bahia, Brazil, Sep/17-20, 2017) [Plenary talk]
*) Open Quantum Systems
(Bengaluru, India, Jul/17-28, 2017)
*) FQMT 2017: Frontiers of Quantum and Mesoscopic Thermodynamics
(Prague, Czech Republic, Jul 09-15, 2017)
*) NMP17: Nuclei and Mesoscopic Physics 2017 Conference
(East Lansing MI, USA, Mar 06-10, 2017)
*) The Royal Society
(London, UK, Feb/6-7, 2017)
*) Universidad Autónoma de Mexico

(Mexico City, Mexico, Jan/23, 2017)
2016
*) Benemérita Universidad Autónoma de Puebla
(Puebla, Mexico, Sep/30, 2016)
*) University of Waterloo
(Waterloo, Canada Aug/31, 2016)
*) University of Heidelberg
(Heidelberg, Germany, Jul/05-07, 2016)
*) 10th International Workshop on Disordered System (IWDS10)
(Brescia, Italy, Jun/27-Jul/01, 2016)
*) Workshop: Quantum non-equilibrium phenomena
[Organizer]
(International Institute of Physics, Natal, Brazil, Jun/06-18, 2016)
*) Workshop: Quantum Phase Transitions in Nuclei (QPTn)
(Prague, Czech Republic, Jun/6-9, 2016)
*) 6th International Conference on Nonlinear Science and Complexity
(São José dos Campos, Brazil, May/16-20, 2016) [Plenary Talk]
*) UMass- Boston
(Boston, USA, Mar/30, 2016)
2015
*) University of Southern California
(Los Angeles, CA, Dec/11, 2015)
*) Workshop Isolated many-body quantum systems out of equilibrium: from unitary time evolution to quantum kinetic equations
(Bad Honnef, Germany, Nov/30-Dec/03, 2015)
) ECT Workshop on excited-state quantum phase transitions
(Trento, Italy, Sept/21-25, 2015)
*) FQMT15 - Frontiers of Quantum and Mesoscopic Thermodynamics
(Prague, Czech Republic, Jul/27-Aug/01, 2015)
*) Workshop Beyond integrability: The mathematics and physics of integrability and its breaking in low-dimensional strongly correlated quantum phenomena
(Montreal, Canada, Jul/13-17, 2015)
*) Harvard University Group Seminar
(Cambridge, MA, USA, May/14 2015)
*) Workshop: Aspects of non-equilibrium dynamics in quantum computation: adiabaticity, noise and many-body localization
(New York, NY, USA, Apr/06-09 2015)
*) UMass-Amherst Seminar
(Amherst, MA, USA, Apr/02 2015)
*) ITAMP at Harvard University
(Cambridge, MA, USA, Mar/13 2015)
*) Workshop on quantum information and thermodynamics
(São Carlos, SP, Brazil, Feb/23-27 2015)
*) UMass Boston Colloquium
(Boston, MA, USA, Feb/19 2015)