

Lea Ferreira dos Santos

Department of Physics
Yeshiva University, SCW
245 Lexington Ave
New York, NY 10016, USA

Phone: 1-203-243-7936
Email: lsantos2@yu.edu
<http://yu.edu/faculty-bios/santos/>

RESEARCH INTERESTS: many-body quantum systems, non-equilibrium quantum dynamics, thermalization, quantum transport, quantum chaos, spin systems, many-body localization, quantum phase transition, quantum control, dynamical decoupling methods, decoherence, quantum-classical transition.

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 **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 and Chair**
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

GRANTS AWARDED:

- 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” (Research Network Proposal, DMS-1107444) (core faculty of the Yeshiva Node)
- Research Corporation (2009-2010)** **Cottrell College Science Award:** Transport Properties and Control in Low-Dimensional Quantum Many-Body Systems

INTERNAL GRANTS:

- J. Alexander Foundation (2018-2019)** Grant awarded to the Physics Department to support research facilities.
- J. Alexander Foundation (2013-2014)** Grant awarded to the Physics Department at Stern College to support research facilities and travel expenses of students and postdocs.
- Kressel Fellowships 2011- 2014, 2016- 2017** Fellowship to cover undergraduate students’ research activities.

AWARDS and HONORS:

- 2017 **Outstanding Referee** for the Journal of American Physical Society
- 2015 **Cottrell Scholar**
- 2015 Supported 3-month visit to the ITAMP at Harvard.
- 2012-2017 **NSF CAREER Award.**
- 2010 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.

SHORT VISITS (lectures, talks, and discussions):

- Sep 2018 Invitation for the program “Dynamics of Quantum Information”, KITP (Kavli Institute for Theoretical Physics), University of California, Santa Barbara, USA.
- Jan 2017 Invitation to give 4 lectures about nonequilibrium quantum dynamics and thermalization
National Autonomous University of Mexico (UNAM), Mexico City, Mexico.
- Nov-Dec 2015 Invitation for the program “Many-body Localization”, **KITP** (Kavli Institute for Theoretical Physics), University of California, Santa Barbara, USA.
- Feb-Apr 2015 Invitation for a supported 3-month visit to the **ITAMP** (Institute For Theoretical Atomic Molecular And Optical Physics)
Harvard-Smithsonian Center for Astrophysics, Cambridge, MA USA.
- Oct-Nov 2014 Instituto de Física, Benemérita Universidad Autónoma de Puebla, Mexico.
- August 2014 Invitation for the program “Many-Body Quantum Systems Far from Equilibrium”, **Aspen Center for Physics**, Aspen, USA.
- August 2013 Program “Quantum Many Body Systems out of Equilibrium”, **Max Planck Institute**, Dresden, Germany.
- August 2012 Program “Quantum Dynamics in Far from Equilibrium Thermally Isolated Systems”, **KITP** (Kavli Institute for Theoretical Physics), University of California, Santa Barbara, USA.
- June 2011 Program “Few- and Many-Body Physics in Cold Quantum Gases Near Resonances”, **Aspen Center for Physics**, Aspen, USA.
- February 2011 Instituto de Física, Benemérita Universidad Autónoma de Puebla, Mexico
- May 2010 Instituto de Física Teórica – State University of São Paulo, Brazil.
- August 2010 Program “Out-of-Equilibrium Quantum Systems”
KITP (Kavli Institute for Theoretical Physics), University of California, Santa Barbara, USA.
- September-
October 2009 Program “Quantum Information Science”,
KITP (Kavli Institute for Theoretical Physics), University of California, Santa Barbara, USA.
- February-
March 1995 Research performed with Professor Wojciech H. Zurek on quantum computers,
Los Alamos National Laboratory, New Mexico, USA.

SHORT TERM VISITORS:

- Prof. Ivan Oliveira (CBPF, Brazil), Jun 2017.
- Prof. Itzhak Roditi (CBPF, Brazil), Mar 2016.
- Prof. Francisco Pérez-Bernal (University of Huelva, Spain), Aug-Sep 2015.
- Dr. Manan Vyas (Washington State University), Oct-Dec 2013.
- Prof. Felix Izrailev (Benemérita Universidad Autónoma de Puebla, Mexico, and Michigan State University), Sep-Dec 2011.
- Dr. Guillermo Quintero (Fulbright Fellow, Univ. de Buenos Aires, Argentina), Sep-Nov 2011

TEACHING EXPERIENCE:

**2 undergraduate courses per semester (7 hours/week)
since joining Yeshiva University in September 2007**

- YESHIVA UNIVERSITY** All lecture notes and booklets prepared for the courses are posted online at <http://yu.edu/faculty-bios/santos/courses/>
- Introductory Physics I** Fall 2007, 2008, 2009 (2x), 2010, 2011, 2012, 2013, 2015, 2016, 2017
This is the first part of a two-semester algebra-based Introductory Physics course with a high percentage of pre-med students. All the slides, problems to be solved in class and their solutions are handed in to the students in a booklet on the first day of class. After every 10-20 minutes of theory, students are required to solve assessing problems individually or in groups. Student-student interaction is motivated. Demonstrations, short videos, curiosities about the scientists involved in the topic of the class and their historical moments are also presented.
- Introductory Physics II** Spring 2008, 2009, 2010, 2012, 2013, 2014, 2015, 2017, 2018
Same methodology described above.
- Computational Methods in Scientific Research** Taught for the first time at Stern College in the Fall 2011
Fall 2011, Spring 2013, Fall 2015
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. They solve long numerical assignments.
- Introduction to Modern Physics** Fall 2008, Fall 2010, Spring 2012, Spring 2013, Spring 2014
In this course the students get familiar with the two pillars of modern physics, quantum mechanics and relativity. The subjects are put in historical context. There are movies, games, and various activities that stress student-student interaction. Basic notions of computational methods are introduced so that the students can solve some of the assignments numerically.
- Introduction to Quantum Mechanics** Taught for the first time at Stern College for Women in the Fall 2007
Fall 2007, Spring 2009, Spring 2010, Fall 2012, Fall 2013
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 in quantum mechanics.
- Introduction to Solid State Physics** Taught for the first time at Stern College for Women in the Spring 2008
This course is intended to students going to graduate schools in physics. They are introduced to basic notions of condensed matter physics and study on their own an advanced topic for a 20-minute oral presentation.
- DARTMOUTH COLLEGE**
- 2005 - 2006 Substituted instructor in undergraduate lectures on Quantum Mechanics and in graduate lectures on Methods in Applied Mathematics and Highlights in Quantum Information Science. Attended workshops on “The Art of Teaching Undergraduates”.
- MICHIGAN STATE UNIVERSITY**
- 2003 - 2004 Substituted instructor in undergraduate and graduate lectures on Statistical Mechanics and Thermodynamics.

RESEARCH MENTORSHIP

Postdoctoral fellows:

- Mauro Schiulaz (current)
- Marco Tavora (2015 - 2016)
- Eduardo Jonathan Torres Herrera (2012 - 2014)
- Manan Vyas (2013)

Graduate students:

- Mohamad Nikman (2016 - 2017)
[David Cory's student at the University of Waterloo, Canada.]
- Pablo Zangara (2012 - 2013)
[Horacio Pastawski's student at the Universidad Nacional de Cordoba, Argentina.]

Undergraduate students:

22 students and 6 publications in peer-reviewed journals: 20 female undergraduates from Stern College, 1 female undergraduate from Dartmouth College, 1 male student from Yeshiva College and 1 from the Indian Institute of Technology Kanpur.

[Honor thesis: senior project concluded in 3 semesters.]

[Kressel scholar: prestigious and competitive scholarship to support student's research for 1 year.]

KRESSEL SCHOLARS & HONOR THESES:

- Jonathan Karp (2015-2017) [physics major, **1 publication**]
Many-body quantum systems far from equilibrium.
He will give an oral presentation of this work at the APS **March Meeting**, 2017.
- Davida Kollmar (2012-2013) [physics major, **2 publications**]
Using entropy to detect quantum phase transitions.
She gave an oral presentation of this work at the APS **March Meeting**, 2013.
- Kira Joel (2012-2013) [physics major, **1 publication**]
Dynamics of quantum systems with many interacting particles
She gave an oral presentation of this work at the APS **March Meeting**, 2013.
- Aviva Gubin (2011-2012) [physics major, **1 publication**]
Microscopic origins of irreversibility
She gave an oral presentation of this work at the APS **March Meeting**, 2012.

HONOR THESES:

- Shira Siegel (2017--) [physical science major]
Localization in disordered systems
- Tamar Felman (2016-2017) [physical science major]
Excited State Quantum Phase Transitions
- Elisheva Elbaz (2015-present) [pre-engineering major]
Many-body quantum systems out of equilibrium
- Ayelet Friedman (2012-2013) [math major]
Quantum interference as the cause of stability of doublons
- Julie Dinerman (2009-2010) [physics and math major, **1 publication**]
Manipulation of the dynamics of many-body systems via quantum control methods.
She gave an oral presentation of this work at the APS **March Meeting**, 2010.
- Shoshana Gilbert (2009-2010) [biology major]
Decoherence and the measurement problem.

SUMMER OR SEMESTER RESEARCH EXPERIENCE:

- Bar Alluf (2018) [physics major]
- Aviva Shooman (2018) [pre-engineering]
- 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**]
Interplay between interaction and disorder in Heisenberg spin-1/2 chains
She gave an oral presentation of this work at APS **March Meeting**, 2009, in a Focus Session.
- 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)
[Now an engineering student at Stony Brook University.]
- Zoe Rothstein (2012)
[Now a computer science student at the MIT.]

WOMEN IN PHYSICS:

- Developed research projects with **20 female undergraduates and 2 female high school students**,
- Mentored 3 students from the Jewish Foundation for the Education of Women (**JFEW**) **fellowship**, which provides financial support and individual guidance to female students majoring in science.
- Meetings with physics teachers from high schools for girls for developing activities and engaging students in research at Stern College for Women of Yeshiva University.
- Supported 6 female undergraduate students to give **oral presentations** at **APS March Meetings**.
- Helped student with application for **child-care support** from the APS to attend the March Meeting.
- Prepared presentations on “Why study physics” for Open Houses and Major Fairs at Stern College.
- Obtained the **NSF Travel Grant for Women Speakers** (covered the expenses of Professor Linda Reichl’s visit to Stern College for Women)
- Organized **recruiting visit** of chairs from other universities to Stern College for Women.
- Wrote 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).
- Gave a talk at Stern College for Women about the attended 3rd IUPAP International **Conference on Women in Physics**, including history, program, country papers and posters, statistics and resolutions.

COMMITTEE SERVICES and SYNERGISTIC ACTIVITIES:**EXTERNAL:**

- Referee for Science, 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, Proceedings of the Royal Society, Entropy.
- Referee for the National Science Foundation, Research Corporation, German Research Foundation, the Netherlands Organization for Scientific Research.
- Member of the American Physical Society, International Association of Mathematical Physics, American Association of Physics Teachers, ANACAPA Society, Committee of the Concerned Scientist.
- APS Metropolis Award Selection Committee (2018)
- Participation on the meetings of the ANACAPA Society (2010, 2012, 2013). The Society promotes research in physics at primarily undergraduate institutions.
- Member of the 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 (2011)
- Tutorials about many-body quantum systems in South Africa and Turkey.
- Assessed physics PhD thesis for the University of Queensland, Australia (2011).
- 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).
- Member of the scientific committee of a summer school in Turkey (2014, 2016)
- Organizer of workshops in Brazil (2008, 2016) and South Korea (2018).

INTERNAL:

- Speaker at the Nobel Prize Nanosecond Party at Yeshiva College.
- Advisor of pre-engineering students from the joint Yeshiva-Columbia engineering program.
- Assessment Statement and Rubrics for the Physics Department (2013-2018).
- Curriculum development: new undergraduate courses.
- Helped students with the creation of the Physics Club at Stern College for Women.
- Student Science Club Speakers Budget Committee.
- Committee to approve and invite speakers for the Physics Colloquium.
- Executive Committee of the Division of Natural Sciences and Mathematics of Yeshiva University
- Sunday of hands on science: taught computational tools to visiting high school students.
- Academic Standards Committee for Stern College for Women.
- Interviewers for the Honors Program.
- Organizer of open houses and major fairs; Expansion of the physics section of the library.
- Restructuring of the Physics, Physical Science, and Pre-Engineering majors.
- Letters of recommendation for more than 100 students.

PUBLICATIONS IN PEER-REVIEWED JOURNALS

[h-index 30]

AFTER JOINING YESHIVA UNIVERSITY:

79) M. Niknam, L. F. Santos, D. G. Cory

"Sensitivity of quantum information to environment perturbations measured with the out-of-time-order correlation function"[<https://arxiv.org/abs/1808.04375>]

78) Jorge Chávez-Carlos, B. López-del-Carpio, Miguel A. Bastarrachea-Magnani, Pavel Stránský, Sergio Lerma-Hernández, Lea F. Santos, Jorge G. Hirsch

"Quantum and Classical Lyapunov Exponents in Atom-Field Interaction System"[<https://arxiv.org/abs/1807.10292>]

77) Mauro Schiulaz, E. J. Torres-Herrera, Lea F. Santos,

"Thouless and Relaxation Time Scales in Many-Body Quantum Systems"[<https://arxiv.org/abs/1807.07577>]76) 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)

75) E. J. Torres-Herrera, L. F. Santos,

Signatures of chaos and thermalization in the dynamics of many-body quantum systems[<https://arxiv.org/abs/1804.06401>]

74) M. Schiulaz, M. Távora, L. F. Santos,

*"From few- to many-body quantum systems"*Quantum Science and Technology **3**, 044006 (2018)

73) F. Borgonovi, F. M. Izrailev, L. F. Santos,

"Exponentially fast dynamics in the Fock space of chaotic many-body systems"[<https://arxiv.org/abs/1802.08265>]

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)**[PRL]**

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"*The 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)**[Rapid Communication]**

Before 2018:

68) E. J. Torres-Herrera, L. F. Santos,

"Dynamical Manifestations of Quantum Chaos: Correlation Hole and Bulge", **[invited special issue]**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) **[invited special issue]**
- 65) M. Sindelka, L. F. Santos, N. Moiseyev
"Power-law Decay Exponents: a Dynamical Criterion for Predicting Thermalization",
Physical Review A **95**, 010103(R) (2017) **[Rapid Communication]**
- 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)
- 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) **[Rapid Communication]**
- 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) **[invited special issue /with undergraduate student]**
- 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. Zelevinsky,
"Quantum chaos and thermalization in isolated systems of interacting particles",
Physics Reports **626**, 1 (2016) **[Review article]**
- 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) **[PRL]**
- 57) E. J. Torres-Herrera, M. Távora, and L. F. Santos,
Survival Probability of the Néel State in Clean and Disordered Systems: an Overview
B. J. Phys. **46**, 239 (2016)
- 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) **[Rapid Communication]**
- 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) **[with undergraduate student]**
- 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)
- 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) **[with undergraduate students]**
- 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) **[invited special issue]**
- 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) **[Rapid Communication]**
- 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). **[PRL]**
- 40) A. Gubin and L. F. Santos
Quantum chaos: an introduction via chains of spins-1/2,
American Journal of Physics **80**, 246 (2012). **[with undergraduate student]**
- 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
On the entropy of isolated quantum systems after a quench,
Physical Review Letters **107**, 040601 (2011). [PRL]
- 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). [Rapid Communication]
- 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) [invited special issue/with undergraduate student]
- 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).
- 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). [with undergraduate students]
- 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).
- 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).

25) W. Zhang, V. V. Dobrovitski, L. F. Santos, L. Viola, and B. N. Harmon
Suppression of electron spin decoherence in a quantum dot,
Journal of Modern Optics **54**, 2629 (2007).

PUBLISHED BEFORE JOINING YESHIVA UNIVERSITY:

24) W. Zhang, V. V. Dobrovitski, L. F. Santos, L. Viola, and B. N. Harmon
Dynamical control of electron spin coherence in a quantum dot: A theoretical study,
Physical Review B **75**, 201302(R) (2007).

23) L. F. Santos and L. Viola,
Enhanced Convergence and Robust Performance of Randomized Dynamical Decoupling,
Physical Review Letters **97**, 150501 (2006).

22) L. Viola and L. F. Santos,
Randomized Dynamical Decoupling Techniques for Coherent Quantum Control,
Journal of Modern Optics **53**, 2559 (2006).

21) L. F. Santos,
Creation of stable multipartite entangled states in spin chains with defects,
International Journal of Quantum Information **4**, 563 (2006).

20) C. Hicke, L. F. Santos and M. I. Dykman,
Fault-Tolerant Landau-Zener Quantum Gates
Physical Review A **73**, 012342 (2006).

19) L. F. Santos and L. Viola,
Dynamical control of qubit decoherence: Random versus deterministic schemes,
Physical Review A **72**, 062303 (2005).

18) F. Pérez-Bernal, L. F. Santos, P. H. Vaccaro, and F. Iachello,
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17) M. I. Dykman, L. F. Santos and M. Shapiro,
Many-particle confinement by constructed disorder and quantum computing,
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16) M. I. Dykman, L. F. Santos, M. Shapiro, and F. M. Izrailev
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15) L. F. Santos and G. Rigolin,
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14) L. F. Santos, M. I. Dykman, F. M. Izrailev, and M. Shapiro,
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13) L. F. Santos, G. Rigolin, and C. O. Escobar,
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- 11) M. I. Dykman and L. F. Santos,
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- 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,
Entanglement in quantum computers described by the XXZ model with defects,
Physical Review A **67**, 062306 (2003).
- 8) L. F. Santos, Dimitri Kusnezov and Ph. Jacquod,
Ground State Properties of Many-Body Systems in the Two-Body Random Ensemble and Random Matrix Theory, Physics Letter B **537**, 62 (2002).
- 7) L. F. Santos and C. O. Escobar,
Quantum open systems and turbulence,
Physical Review A **65**, 022106 (2001).
- 6) L. F. Santos and C. O. Escobar
Burgers turbulence and the continuous spontaneous localization model,
Europhysics Letters **54**, 21 (2001).
- 5) L. F. Santos and C. O. Escobar
A proposed solution to the tail problem of dynamical reduction models,
Physics Letters A **278**, 315 (2001).
- 4) L. F. Santos and C. O. Escobar
Stochastic differential equations for the continuous spontaneous localization model,
Modern Physics Letters A **15**, 1833 (2000).
- 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 CHAPTER:

- 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 - Recent Progress and Outlook**
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:

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.

8) E. J. Torres-Herrera and L. F. Santos

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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

Women in Physics in the United States,

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

Many-particle localization by constructed disorder and quantum computing,

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 2011

*) Thermalization, Many-Body-Localization and Generalized Hydrodynamics
(Bengaluru, India, Nov/24-29, 2019)

*) Universality and ergodicity in quantum many-body systems
(Simons Center, Stony Brook, NY, Aug/26-Oct/18, 2019) [organizer]

*) Conference on 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)

*) Active and Driven Matter: Connecting Quantum and Classical Systems
(Aspen, CO, Jun/09-21, 2019)

*) Open Quantum System Dynamics: Quantum Simulators and Simulations Far From Equilibrium
(KITP, Santa Barbara, CA, Apr/29-May/03, 2019)

*) II Workshop on Quantum Information and Thermodynamics
(Natal, Brazil, Mar/11-22, 2019)

*) Conference on Many-Body Quantum Chaos
(Aspen, CO, Mar/10-15, 2019)

*) Conference on Nonequilibrium and transport in many-body systems
(Rehovot, Israel, Jan/20-24, 2019)

*) Workshop Ergodicity Breaking in Many Body Systems
(Natal, Brazil, Nov/12-23, 2018)

*) Random Matrices, Integrability and Complex Systems
(Yad Hashmona, Israel, Oct/03-08, 2018) [selected contribution]

*) FOR 2692 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)
 - *) 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: 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)
 - *) 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)
- *) 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)
- *) Queen College Colloquium
(New York, NY, USA, Oct/27 2014)
- *) Bard College Colloquium
(New York, NY, USA, Oct/08 2014)
- *) C.N. Yang Institute for Theoretical Physics Seminar
(Stony Brook, NY, USA, Oct/02 2014)
- *) 2nd Summer School on Exact and Numerical Models for Low Dimensional Quantum Structure
(Izmir, Turkey, Aug/23 - Aug/31, 2014)
- *) 9th International Workshop on Disordered Systems
(San Antonio, Texas, Aug/18 – Aug/22, 2014)
- *) Aspen Summer Program: Many-Body Quantum Systems Far from Equilibrium
(Aspen, CO, USA, Aug/10 - Aug/31, 2014)
- *) Quantum-Many Body Dynamics Workshop
(Perimeter Institute, May, 2014)
- *) NMP14: Nuclei and Mesoscopic Physics 2014 Conference
(Michigan, USA, May/05-09, 2014)
- *) Penn State CAMP Seminar

(University Park PA, USA April 29, 2014)

*) Public lecture and colloquium speaker for the induction ceremony of the Sigma Pi Sigma society, University of North Carolina (Wilmington NC, USA April 10-11, 2014)

*) IIP: Workshop on Quantum Integrability, Conformal Field Theory and Topological Quantum Computation

(Natal, Brazil, Mar/23-Apr/06, 2014)

*) ANACAPA Society Meeting

(Georgia Regents University, Augusta, GA, USA, Dec/13-15, 2013)

*) The City College of New York

(New York, NY, September 18, 2013)

*) QSOE13: Quantum Many Body Systems out of Equilibrium

(Dresden, Germany, Aug/10-23, 2013)

*) FQMT13: Frontiers of Quantum and Mesoscopic Thermodynamics

(Prague, Czech Republic, Jul/29-Aug/03, 2013)

*) FINES-2013: Finite-Temperature Non-Equilibrium Superfluid Systems

(Queenstown, New Zealand, February 16-20, 2013)

*) Brookhaven National Lab^[11]

(Upton, NY, USA, January 17, 2013)

*) Rutgers University

(New Jersey NJ, USA, December 11, 2012)

*) Workshop on Correlations and Entanglement in Many-body Systems Out of Equilibrium

(National Center for Theoretical Sciences, Hsinchu, Taiwan, Sep/10-Sep/13, 2012)

*) Program: Quantum Dynamics in Far from Equilibrium Thermally Isolated Systems

(KITP, Santa Barbara, CA, USA, Aug/06-Aug/24, 2012)

*) Workshop on The Beauty of Integrability: low-dimensional Physics, Statistical Models and Solitons

(International Institute of Physics at the UFRN Campus, Natal, RN, Brazil, Jul/15-Jul/28, 2012)

*) ANACAPA Society Meeting

(Hamline University, St. Paul, MN, USA, May/11-May/12, 2012)

*) KI-NET Organizational Meeting

(University of Maryland, College Park, Baltimore, MD, USA, Mar/08-Mar/10, 2012)

*) Frontiers of quantum condensed matter physics: light, matter and unusual devices out of equilibrium

(CUNY, New York, NY, USA, Mar/05-Mar/09, 2012)

*) FQMT11 - Frontiers of Quantum and Mesoscopic Thermodynamics

(Prague, Czech Republic, Jul/25-Jul/30, 2011)

*) Joint UMB-BU Colloquium on Quantum Nonequilibrium Dynamics

(Boston, USA, Mar/26, 2011)

*) Stellenbosch Workshop on Equilibration and Equilibrium (Talk and Tutorial)

(South Africa, Mar/07 - Mar/18, 2011)

*) Third Workshop on Nuclei and Mesoscopic Physics

(Michigan, USA, Mar04 - Mar/10, 2011)