

## Édgar Roldán

Abdus Salam International Centre for  
Theoretical Physics (ICTP)  
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Date: 8.2.2021



United Nations  
Educational, Scientific and  
Cultural Organization

## Curriculum Vitae

**Last Name:** Roldán Estébanez  
**First Name:** Édgar  
**Degree:** Ph. D.  
**Date of birth:** 16.07.1985  
**Place of birth:** San Sebastian (Spain)  
**Nationality:** Spanish

## PROFESSIONAL EXPERIENCE

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- 2018 - current **Associate Research Officer**  
ICTP  
Quantitative Life Sciences  
Trieste, Italy
- 2016 - 2018 **PKS Distinguished Postdoctoral Fellow**  
Max-Planck Institute for the Physics of Complex Systems  
Biological Physics Division  
Dresden, Germany
- 2014 - 2016 **Guest Scientist**  
Max-Planck Institute for the Physics of Complex Systems  
Biological Physics Division (Frank Jülicher group)  
Dresden, Germany
- 2014 **Postdoctoral researcher**  
ICFO - The Institute of Photonic Sciences  
Optical Tweezers Lab (Dmitry Petrov lab)  
Castelldefels (Barcelona), Spain
- 2013 - 2014 **Postdoctoral researcher**  
ICMM (CSIC) - Instituto de Ciencia de Materiales de Madrid  
Madrid, Spain

2009 - 2013    **PhD student**  
Universidad Complutense de Madrid  
Departamento de Física Atomica, Molecular y Nuclear  
Group of Statistical Mechanics (Juan M.R. Parrondo group)  
Madrid, Spain

## QUALIFICATIONS

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2016            **Assistant Professor**  
Spanish National Agency for Assessment and Accreditation (ANECA)

2013            **PhD in Physics**  
Title: *Irreversibility and dissipation in microscopic systems*  
Date: 29.07.2013  
Universidad Complutense de Madrid, Madrid, Spain  
Qualification: *Summa cum laude*

2009            **Master in Fundamental Physics**  
Universidad Complutense de Madrid, Madrid, Spain

2008            **Bachelor in Physics**  
Universidad Complutense de Madrid, Madrid, Spain

## AWARDS AND HONOURS

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2019            **CNRS Chercheur Invite Federation Doebelin**  
Universite Cote d'Azur, Nice (France)

2019            **CNRS Chair Joliot**  
ESPCI, Paris (France)

2018            **EPL Distinguished Referee 2017**  
European Physical Society

2017            **EPS-SNPD Early Career Prize**  
European Physical Society

2017            **MPIPKS Distinguished Postdoctoral Fellow**  
Max Planck Institute for the Physics of Complex Systems

2017            **Liquid Art Contest - scientific artwork public outdoor display**  
10th Liquid Matter Conference - LIQUIDS 2017  
Ljubljana (Slovenia), 17th July

2017            **Prize "for excellent poster presentation"**  
Gordon Research Conference "Stochastic Physics in Biology"  
Ventura, California (United States), 12th January

2014            **International Springer Theses Prize**

- 2014      **PhD extraordinary prize**  
Universidad Complutense de Madrid, Madrid, Spain
- 2007      **Second Prize of Award “Premio Promoción 60”**  
Facultad de Ciencias Físicas  
Universidad Complutense de Madrid, Madrid, Spain

## PUBLICATIONS

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1.    **Stochastic resetting antiviral therapies prevents drug resistance development**  
AM Ramoso, JA Magalang, D Sánchez-Taltavull, JP Esguerra, **É Roldán**  
EPL (Europhysics Letters) 132 (5), 50003 (2020)
2.    **Extreme-value Statistics of Stochastic Transport Processes**  
A Guillet, **É Roldán**, F Jülicher  
New J. Phys. **22**, 123038 (2020)
3.    **Energetics of critical oscillators in active bacterial baths**  
A Gopal, **É Roldán**, S Ruffo  
arXiv:2011.00858 (2020) - submitted to J. Phys. A
4.    **Optimal work extraction and the minimum description length principle**  
L Touzo, M Marsili, N Merhav, **É Roldán**  
J. Stat. Mech. **2020** (9), 093403 (2020)
5.    **Thermodynamics of Gambling Demons**  
G Manzano, D Subero, O Maillet, R Fazio, J Pekola, **É Roldán**  
arXiv:2008.01630 (2020) - accepted in Phys. Rev. Lett.
6.    **Lecithin as a putative biodegradable blocker of SARS-CoV-2**  
MN Qaisrani, JU Rehman, R Belousov, EM Goliaei, I Giroto, R Franklin, O Güell,  
A Hassanali, **E Roldan**  
chemrxiv 12670952 (2020) - submitted to J. Chem. Phys. B
7.    **First-passage Fingerprints of Water Diffusion near Glutamine Surfaces**  
R. Belousov, M. N. Qaisrani, A. A. Hassanali, and **E Roldan**  
Soft Matter DOI:10.1039/D0SM00541J (2020)
8.    **Stochastic thermodynamics: experiment and theory**  
J Bechhoefer, S Ciliberto, S Pigolotti, and **E Roldán**  
J. Stat. Mech. **2020** (6), 064001 (2020)
9.    **Controlling Particle Currents with Evaporation and Resetting**  
G. Tucci, A. Gambassi, S. Gupta, and **E Roldan**  
Physical Rev. Research **2** (4), 043138 (2020)

10. **Modelling strategies to organize healthcare workforce during pandemics: application to COVID-19**  
D Sanchez-Taltavull, D Candinas, **E Roldan**, and G Beldi  
medRxiv DOI:10.1101/2020.03.23.20041863 (2020)
11. **Universal first-passage-time distribution of non-Gaussian currents**  
S. Singh, P. Menczel, D. S. Golubev, I. M. Khaymovich, J. T. Peltonen, C. Flindt, K. Saito, **E. Roldan**, and J. P. Pekola  
Phys. Rev. Lett. **122**, 230602 (2019)
12. **Quantum martingale theory and entropy production**  
G. Manzano, R. Fazio and **É. Roldán**  
Phys. Rev. Lett. **122**, 220602 (2019)
13. **Exact distributions of currents and frenesy for Markov bridges**  
**É. Roldán** and P. Vivo  
Phys. Rev. E **100** (4), 042108 (2019)
14. **Integral fluctuation relations for entropy production at stopping times**  
I. Neri, **É. Roldán**, S. Pigolotti and F. Jülicher  
J. Stat. Mech. **2019** (10), 104006 (2019)
15. **Martingale theory for housekeeping heat**  
R. Chetrite, S. Gupta, I. Neri, and **É. Roldán**  
EPL **124**, 60006 (2018) - **Editor's choice**
16. **Records of entropy production in an electronic double dot**  
S. Singh, **É. Roldán**, I. Neri, I. M. Khaymovich, D. S. Golubev,  
V. F. Maisi, J. T. Peltonen, F. Jülicher and J. P. Pekola  
Phys. Rev. B **99**, 115422 (2019)
17. **Arcsine Laws in Stochastic Thermodynamics**  
A. C. Barato, **É. Roldán**, I. A. Martínez, and S. Pigolotti  
Phys. Rev. Lett. **121** (9), 090601 (2018).
18. **Multiplex Decomposition of Non-Markovian Dynamics and the Hidden Layer Reconstruction Problem**  
L. Lacasa, I. P. Mariño, J. Miguez, V. Nicosia,  
**É. Roldán**, A. Lisica, S. W. Grill, and J. Gómez-Gardeñes  
Phys. Rev. X **8**, 031038 (2018)
19. **Arrow of Time in Active Fluctuations**  
**É. Roldán**, J. Barral, P. Martin, J.M.R. Parrondo and F. Jülicher  
arXiv:1801.01577, submitted to Phys. Rev. Lett. (2018)
20. **Testing optimality of sequential decision making**  
M. Dörpinghaus, I. Neri, **É. Roldán**, H. Meyr and F. Jülicher  
arXiv:1801.01574 (2018)

21. **Generic properties of stochastic entropy production**  
S. Pigolotti, I. Neri, **É. Roldán** and F. Jülicher  
Phys. Rev. Lett. **119** (14), 140604 (2017)
22. **Path-integral formalism for stochastic resetting:  
Exactly solved examples and shortcuts to confinement**  
**É. Roldán** and S. Gupta  
Phys. Rev. E **96** (2) 022130 (2017)
23. **Statistics of infima and stopping times of entropy production  
and applications to active molecular processes**  
I. Neri, **É. Roldán**, and F. Jülicher  
Phys. Rev. X. **7**, 011019 (2017)
24. **Colloidal heat engines: a review**  
I. A. Martínez, **É. Roldán**, L. Dinis, and R. A. Rica  
Soft Matter **13** (1), 22-36 (2017)  
Special Issue Emerging Investigators 2017
25. **Mechanisms of backtrack recovery by RNA polymerases I and II**  
A. Lisica, C. Engel, M. Jahnel, **É. Roldán**, E. A. Galburt, P. Cramer and S. W. Grill  
PNAS **113** (11), 2946-2951 (2016)
26. **Stochastic resetting in backtrack recovery by RNA polymerases**  
**É. Roldán**, A. Lisica, D. Sanchez-Taltavull and S. W. Grill  
Phys. Rev. E **93** (6), 062411 (2016)
27. **Brownian Carnot engine**  
I. A. Martínez\*, **É. Roldán**\*, L. Dinis, J. M. R. Parrondo, D. Petrov and R. A. Rica  
Nature Phys. **12**, 67-70 (2016)  
\* equal contribution
28. **Thermodynamics at the microscale: from effective heating to the Brownian  
Carnot engine**  
L. Dinis , I. A. Martínez, **É. Roldán**, J. M. R. Parrondo, and R. A. Rica  
J. Stat. Phys. **5**, 054003 (2016)  
Special issue Focus on Stochastic Thermodynamics
29. **Decision Making in the Arrow of Time**  
**É. Roldán**, I. Neri, M. Dörpinghaus, H. Meyr and F. Jülicher  
Phys. Rev. Lett. **115**, 2506023 (2015)
30. **Adiabatic processes realized with a trapped Brownian particle**  
I. A. Martínez, **É. Roldán**, L. Dinis, D. Petrov and R. A. Rica  
Phys. Rev. Lett. **114** (12), 120601 (2015)

31. **Fluctuation theorems between non-equilibrium states in an RC circuit**  
L. Granger, J. Mehlis, **É. Roldán**, S. Ciliberto and H. Kantz  
New J. Phys. **17**, 065005 (2015)
32. **Universal features in the energetics of symmetry breaking**  
**É. Roldán\***, I. A. Martínez\*, J. M. R. Parrondo and D. Petrov  
Nature Phys. **10**, 457-461 (2014)  
Highlighted article in *News and Views* (Nature Physics)  
\* equal contribution
33. **Realization of nonequilibrium thermodynamic processes using external colored noise**  
P. Mestres, I. A. Martínez, A. Ortiz-Ambriz, R. A. Rica and **É. Roldán**  
Phys. Rev. E **90** (3), 032116 (2014)
34. **Measuring kinetic energy changes in the mesoscale with low acquisition rates**  
**É. Roldán**, I. A. Martínez, L. Dinis and R. A. Rica  
Appl. Phys. Lett. **104** (23), 234103 (2014)
35. **Effective heating to several thousand kelvin of an optically trapped sphere in a liquid**  
I. A. Martínez, **É. Roldán**, J. M. R. Parrondo and D. Petrov  
Phys. Rev. E **85** 031129 (2012)
36. **Time series irreversibility: a visibility graph approach**  
L. Lacasa, À. Núñez, **É. Roldán**, J. M. R. Parrondo and B. Luque  
Eur. Phys. J. B **85** (6), 1-11 (2012)
37. **Entropy production and Kullback-Leibler divergence between stationary trajectories of discrete systems**  
**É. Roldán** and J. M. R. Parrondo  
Phys. Rev. E **85** 031129 (2012)
38. **Estimating dissipation from single stationary trajectories**  
**É. Roldán** and J. M. R. Parrondo  
Phys. Rev. Lett. **105** 150607 (2010)

Google Scholar Number of Citations: **1541**

Google Scholar h-Index: **17**

Google Scholar i10-Index: **24**

## BOOKS

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1. **Irreversibility and dissipation in microscopic systems**  
**É. Roldán**

Springer, ISBN 978-3-319-07079-7 (2014)

## CONFERENCE PROCEEDINGS

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1. **An information-theoretic analysis of sequential decision making**  
M. Dörpinghaus, **É. Roldán**, I. Neri, H. Meyr and F. Jülicher  
IEEE International Symposium on Information Theory (ISIT), 3051 (2017)

## ORGANIZATION OF INTERNATIONAL CONFERENCES

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- |      |   |
|------|---|
| 2020 | <b>ICTP-SISSA-CECAM Workshop on Molecular Dynamics and its Applications to Biological Systems</b><br>Online workshop<br>September 21-25                             |
| 2020 | <b>Joint QLS-CMSP Virtual Summer Retreat on Heat, Water, Noise, and Life</b><br>Online workshop<br>July 29-31   |
| 2019 | <b>Biophysical conference</b><br>Hotel Amfora, Hvar, Croatia<br>Aug 20-23   |
| 2019 | <b>Workshop on Martingales in Finance and Physics</b><br>ICTP<br>Trieste, Italy<br>May 24   |
| 2018 | <b>Stochastic Thermodynamics: Experiment and Theory (STET'18)</b><br>Max Planck Institute for the Physics of Complex Systems<br>Dresden, Germany<br>September 10-14 |

## PRESENTATIONS IN INTERNATIONAL CONFERENCES

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|------|---|
| 2020 | <b><i>ICTP-SISSA-CECAM Workshop on Molecular Dynamics and its Applications to Biological Systems</i></b><br>Talk: Martingale stochastic thermodynamics<br>Online talk |
| 2020 | <b>Joint QLS-CMSP Virtual Summer Retreat on Heat, Water, Noise, and Life</b><br>Talk: Lecithin as a Putative Biodegradable Blocker of SARS-CoV-2<br>Online talk       |

- 2019 **XXIV Convegno Nazionale di Fisica Statistica e dei Sistemi Complessi**  
**Talk:** “Martingale theory for stochastic thermodynamics”  
Universita di Parma, Parma June 26
- 2019 **Workshop “Random Talks on Stochastic Thermodynamics”**  
**Invited talk:** “Martingale theory of stochastic thermodynamics”  
Santa Marinella Research Institute, Santa Marinella June 7
- 2019 **Workshop on Martingales in Finance and Physics**  
**Lecture:** “Stochastic thermodynamics: and emerging, evolving field”  
ICTP, Trieste May 24
- 2019 **Workshop “Colloids as a Toolbox for Statistical Mechanics: Heat Engines, Confinement and Thermodynamics”**  
**Invited Talk:** “Experimental construction of a colloidal Carnot engine”  
University of Cambridge, Cambridge March 11
- 2018 **Workshop “Why measure entropy production?”**  
**Invited Talk:** “Arrow of time and entropy production in active fluctuations”  
Princeton Center for Theoretical Sciences, Princeton November 5-7
- 2018 **QT60 - Workshop on thermodynamics, thermoelectrics and transport in quantum devices**  
**Invited Talk:** “Extreme reductions of entropy production in an electronic double dot”  
Hanasaari Cultural Centre, Espoo September 21-23
- 2018 **CONES 2018 - Conference on Non-Equilibrium Systems**  
**Invited Talk:** “Arcsine laws and extreme values in stochastic thermodynamics”  
King’s College London, London June 25-27
- 2018 **Advanced Workshop on Nonequilibrium Systems in Physics, Geo sciences, and Life Sciences**  
**Invited Talk:** “Arcsine laws and extreme values in stochastic thermodynamics”  
ICTP, Trieste May 14-25
- 2018 **DPG Meeting**  
**Talk:** “Records of entropy production in a double quantum dot”  
TU Berlin, Berlin March 11-16
- 2017 **30th Smoluchowski Symposium**  
**Invited Talk:** “Generic Properties of Stochastic Entropy Production”  
Collegium Novum, Krakow September 3-8



- 2017      **LIQUIDS'17 Liquid Matter Conference**  
**Talk:** "Brownian Carnot engine"  
 Cankarjev dom Cultural and Congress Centre, Ljubljana July 17-21
- 2017      **FQMT'17 Frontiers of Quantum and Mesoscopic Thermodynamics**  
**Invited Talk:** "Negative records of entropy production: the infimum law"  
 Orea Hotel Pyramida, Prague, July 10-15
- 2017      **FQMT'17 Frontiers of Quantum and Mesoscopic Thermodynamics**  
 Poster: "Decision Making in the Arrow of Time"  
 Orea Hotel Pyramida, Prague, July 10-15
- 2017      **Climate Fluctuations and Non-equilibrium Statistical Mechanics:  
 an interdisciplinary dialogue**  
**Invited Talk:** "Martingale theory for nonequilibrium thermodynamics"  
 MPIPKS, Dresden, July 10
- 2017      **Dynamics, Thermodynamics and Information Processing in  
 Chemical Networks**  
**Talk:** "Negative records of entropy production: the infimum law"  
*University of Luxembourg, Luxembourg, June 13-16*
- 2017      **DPG Spring Meeting**  
**Talk:** "Extreme values of mesoscopic currents in Physics and Biology"  
 TU Dresden, Dresden, Germany, March 21-25
- 2017      **DPG Spring Meeting**  
**Talk:** "Brownian Carnot engine"  
 TU Dresden, Dresden, Germany, March 21-25
- 2017      **Gordon Research Conference "Stochastic physics in biology"**  
 Poster: "Decision Making in the arrow of time"  
 Ventura, California, United States. January 8-13  
 Awarded with Poster Prize
- 2016      **Principles of biological and robotic navigation**  
 Poster: "Experimental construction of a Brownian Carnot engine"  
 MPIPKS, Dresden, Germany. August 29-31
- 2016      **Information, Probability and Inference in Systems Biology  
 Conference (IPISB2016)**  
 Poster: "Decision Making in the Arrow of Time"  
 IST Austria, Klosteneuburg, Austria. May 18-20
- 2016      **DPG Spring Meeting**  
**Talk:** "Decision Making in the Arrow of Time"  
 Universitat Regensburg, Regensburg, Germany. March 6-12
- 2015      **European Biophysics Congress**  
 Poster: "Quantifying irreversibility in ear hair bundle

- spontaneous oscillations”  
International Congress Center Dresden, Germany. July 18-22
- 2015 **DPG Spring Meeting**  
Poster: “Mechanisms of backtrack recovery in RNA polymerases I and II”  
Technische Universität Berlin, Germany. March 20-25
- 2015 **Workshop on recent Developments In Non-Equilibrium Physics  
"Luxembourg out of Equilibrium"**  
**Talk:** “Thermodynamics of symmetry breaking”  
Université de Luxembourg, Luxembourg. January 12-15
- 2014 **XI GISC Workshop**  
**Talk:** “Thermodynamics of symmetry breaking”  
Universidad Complutense de Madrid, Madrid, Spain. February 7
- 2013 **X GISC Workshop**  
**Talk:** “Detecting active processes from spontaneous oscillations of Ear Hair Bundles”  
Universidad Carlos III, Leganés (Madrid), Spain. February 8
- 2012 **FisEs 2012**  
**Talk:** “Mimicking high-temperature reservoirs for colloidal particles using noisy electric fields”  
IFISC, Palma de Mallorca, Spain. October 18-20
- 2011 **FisEs 2011**  
Poster: “Irreversibility and dissipation in stochastic processes”  
Universitat de Barcelona, Barcelona, Spain. July 2-4
- 2010 **II Workshop MODELICO**  
**Talk:** “Relative entropy as a quantitative measure of irreversibility in non-equilibrium stationary states”  
Centro de Astrobiología INTA-CSIC, Madrid, Spain. November 12
- 2010 **International Symposium on Quantum Thermodynamics**  
**Talk:** “Entropy production and time asymmetry in nonequilibrium stationary states”  
Universität Stuttgart, Stuttgart, Germany. September 13-17
- 2010 **Mechanics of Large Molecular Assemblies**  
**Talk:** “Construction of a microscopic Szilard engine”  
IFISC, Mallorca, Spain. April 8-11
- 2010 **VI GISC Workshop**  
**Talk:** “Dissipation and information in stochastic processes”  
Universidad Carlos III, Madrid, Spain. February 19
- 2009 **kTlog2: Computing Matters.**  
**Talk:** “Estimating dissipation with single stationary trajectories”  
Toledo, Spain. October 22-24
- 2008 **I Congreso Complutense de Divulgación de Física Nuclear y de Partículas**

Poster: "Neutrino mass research: Double Beta Decay and the Nemo Project". Madrid, Spain. July 8

## RESEARCH STAYS

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- |      |  |
|------|--|
| 2019 | <b>ESPCI</b><br>Paris, France<br>April 21 - 6 May  |
| 2019 | <b>King's College London</b><br>Paris, France<br>April 21 - 6 May  |
| 2019 | <b>Cambridge University</b><br>Paris, France<br>April 21 - 6 May   |
| 2018 | <b>Universite Cote d'Azur</b><br>Nice, France<br>December 10-14  |
| 2018 | <b>The Rockefeller University</b><br>New York, United States<br>November 7-9                               |
| 2018 | <b>King's College London</b><br>London, United Kingdom<br>June 25-29                                       |
| 2018 | <b>Aalto University</b><br>Aalto, Finland<br>May 14-18   |
| 2017 | <b>ESPCI</b><br>Paris, France<br>December 18-21  |
| 2017 | <b>Institut Curie - Laboratoire de Physico Chimie</b><br>Paris, France<br>February 23 - March 3            |
| 2012 | <b>ICFO - The institute of photonic sciences</b><br>Castelldefels (Barcelona), Spain<br>November 9-24      |
| 2012 | <b>Max Planck Institute for the Physics of Complex Systems</b><br>Dresden, Germany<br>July 1 - September 1 |

- 2012      **ICFO - The institute of photonic sciences**  
Castelldefels (Barcelona), Spain  
March 28 - April 14
- 2012      **ICFO - The institute of photonic sciences**  
Castelldefels (Barcelona), Spain  
February 6-21
- 2011      **ICFO - The institute of photonic sciences**  
Castelldefels (Barcelona), Spain  
August 20 - September 6
- 2010      **Max Planck Institute for Molecular Cell Biology and Genetics**  
Dresden, Germany  
February 22 - April 8
- 2009      **Max Planck Institute for the Physics of Complex Systems**  
Dresden, Germany  
July 1 - August 10
- 2008      **Max Planck Institute for the Physics of Complex Systems**  
Dresden, Germany  
July 18 - August 18

## INVITED SEMINARS IN EXTERNAL INSTITUTIONS

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- 2021      **“Resetting in biology”**  
Online talk at Biosoft seminar, University of Tel Aviv  
Tel Aviv, Israel, Jan 13
- 2020      **“Martingale theory for stochastic thermodynamics: extrema, stopping times and gambling”**  
Online talk at Nordita  
Stockholm, Sweden, Dec 3
- 2020      **“First-passage times: a refreshing view of biophysical fluctuations”**  
Department of Physics, University of Zagreb  
Zagreb, Croatia, Feb 18
- 2020      **“Heat engines and Carnot efficiency at the nanoscale”**  
DIPC - Donostia International Physics Centre  
Donostia-San Sebastian, Spain, Jan 10
- 2019      **“Martingale theory for nonequilibrium thermodynamics”**  
Laboratoire Gulliver, ESPCI  
Paris, France. May 2
- 2019      **“Arrow of Time and Entropy Production in Active Fluctuations**

- Soft Matter Group, University of Cambridge  
Cambridge, United Kingdom. March 13
- 2019      **“Arrow of Time and Entropy Production in Active Fluctuations”**  
Disordered System Group, Department of Mathematics, Kings college  
London, United Kingdom. March 14
- 2018      **“Martingale theory for nonequilibrium thermodynamics”**  
Laboratoire Dieudonne, Universite Cote d’Azur  
Nice, France. December 11
- 2018      **“Arrow of Time and Entropy Production in Active Fluctuations”**  
Hudspeth Lab, The Rockefeller University  
New York, United States. November 8
- 2018      **“Heat engines and Carnot efficiency at the nanoscale”**  
University of Southampton, Faculty of Engineering and Environment  
Southampton, England. June 29
- 2018      **“Arcsine laws and extreme values in stochastic thermodynamics”**  
PICO group, Aalto University  
Aalto, Finland. May 21
- 2018      **“Records of entropy production at the nanoscale”**  
*QLS Seminar*. Abdus Salam International Centre  
for Theoretical Physics (ICTP)  
Trieste, Italy. January 9
- 2017      **“Heat engines and Carnot efficiency at the nanoscale”**  
*Theoretical Physics Colloquium*. Universität Oldenburg  
Oldenburg, Germany. November 16
- 2017      **“Martingale Theory for Nonequilibrium Thermodynamics”**  
*Theoretical Physics Colloquium*. Institute for Theoretical Physics Cologne  
Cologne, Germany. May 26
- 2017      **“Decision Making and Infima in Physics and Biology”**  
*Seminar* in Laboratoire de Physico Chimie  
Institut Curie. Paris, France. February 28
- 2015      **“Decision Making in the Arrow of Time”**  
*Seminario de Fisica Estadística GISC-UCM*. Departamento de Fisica  
Atomica, Molecular y Nuclear. Universidad Complutense de Madrid  
Madrid, Spain. December 18
- 2015      **“Brownian Carnot engine”**  
*Origin of Life seminar*. Max-Planck Institute for Molecular Cell Biology and

Genetics. Dresden, Germany. October 1

- 2015            **“To cleave or not to cleave: the choice of recovery pathway in RNA polymerase backtracking”**  
*Polymerase day*  
 Deutsches Hygiene-Museum Dresden, Germany. August 25
- 2014            **“Mechanisms of backtrack recovery in RNA polymerases I and II”**  
 Universidad Politecnica de Madrid, Madrid, Spain. December 18th
- 2014            **“Thermodynamics of symmetry breaking”**  
 Universidad de Granada, Granada, Spain. April 22
- 2014            **“Thermodynamics of symmetry breaking”**  
 Centre de Recerca Matematica  
 Bellaterra (Barcelona), Spain. March 12
- 2012            **“Irreversibility and dissipation in the nonequilibrium stationary state“**  
 Grill Lab group meeting  
 Max-Planck Institute for Molecular Cell Biology and Genetics (MPI- CBG),  
 Dresden, Germany. July 14
- 2012            **“Increase of Effective temperature in a colloidal particle up to 3000K” (Joint seminar with Ignacio A. Martínez)**  
 Petrov Lab, ICFO- The Institute Of Photonic Sciences  
 Castelldefels (Barcelona), Spain. November 15

## TEACHING

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- 2020-2021    **Lectures “Biophysics” (52h)**  
 ICTP postgraduate diploma program in Quantitative Life Sciences  
 Trieste, Italy
- 2020            **Lectures “Introduction to biophysics” (24h)**  
 Bachelor of Physics, Universita degli studi di Trieste  
 Trieste, Italy
- 2019-2020    **Lectures “Biophysics” (52h)**  
 ICTP postgraduate diploma program in Quantitative Life Sciences  
 Trieste, Italy
- 2018            **Lectures “Probability Theory” - Master Physics of Complex Systems**  
 SISSA - Scuola Internazionale di Stuti Avanzati Trieste  
 Joint course with Matteo Marsili  
 Trieste, Italy
- 2017            **Lectures “Theoretical Biophysics”**  
 Technische Universität Dresden

- Joint course with Frank Jülicher and Stephan W. Grill  
Dresden, Germany
- 2016      **Practicals for PhD students, Dresden International PhD Program**  
Max Planck Institute for the Physics of Complex Systems  
Dresden, Germany
- 2012-2013    **Lectures “Physics applied to biology”**  
Faculty of Biology and Geology  
Joint course with Luis Dinis  
Universidad Complutense de Madrid, Madrid, Spain
- 2011-2012    **Lectures “Physics applied to biology”**  
Faculty of Biology and Geology  
Joint course with Luis Dinis  
Universidad Complutense de Madrid, Madrid, Spain
- 2007-2008    **Tutorships “Differential Equations I”**  
With J. I. Aranda Iriarte  
Universidad Complutense de Madrid, Madrid, Spain
- 2006-2007    **Tutorships “Calculus I”**  
With J. M. R. Parrondo  
Universidad Complutense de Madrid, Madrid, Spain

## THESIS COMMITTEES

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- 2019      Vice-chair of the PhD Thesis Committee  
Candidate: Nicolas Tizon Escamilla  
PhD in Physics, Universidad de Granada  
Granada, Spain, January 2019
- 2018      Vice-chair of the PhD Thesis Committee  
Candidate: Ryan Cubero  
PhD in Statistical Physics, SISSA  
Trieste, Italy, October 2018
- 2018      External evaluator of the PhD Thesis  
Candidate: Priyo S. Pal  
PhD in Physics, Homi Bhabha National Institute  
Bhubaneswar, India, December 2019
- 2014      Vice-chair of the PhD Thesis Committee  
Candidate: Ángel M. Núñez  
PhD in Physics, Universidad Politecnica de Madrid  
Madrid, Spain, December 19

## SUPERVISION

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- **Roman Belousov** (Russia, Postdoc) Jan 2019 - current
- **Gennaro Tucci** (Italy, PhD student) Feb 2019 - current
- **Fahad Kamulegeya** (Uganda, Diploma student) June 2020
- **Ashwin Gopal** (India, Master student) May 2019 - current
- **Rita Majumdar** (India, STEP student)
- **Jane Garcia** (Phillipines, Summer student) July 2019
- **Ekaterina Vedenchuk** (Russia, Summer student) July 2019
- **Stefano Vrizzi** (Italy, Master student) March 2019 - June 2019
- **Alexandre Guillet** (France, Master student) June 2017 - August 2017

## FUNDING

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- |           |   |
|-----------|---|
| 2020      | <b>Project member of SNF Grant <i>Modelling a desynchronization strategy from the COVID-19 pandemic</i></b><br>CHF 296.250 (275.400 EUR)    |
| 2018      | <b>Application ERC starting grant: Step 2 Interview</b><br><b>Final panel score: A</b><br>(Ranking range 50%, not selected for funding)     |
| 2009-2013 | <b>PhD grant "Beca de Formación de Profesorado Universitario (FPU)"</b><br>Ministerio de Educación y Ciencia, Spanish Government (national) |
| 2008-2009 | <b>Master grant "Beca para estudios de master"</b><br>Obra Social La Caixa, Barcelona, Spain (private)                                      |
| 2007-2008 | <b>Bachelor grant "Beca de Colaboración en la investigación"</b><br>Ministerio de Educación y Ciencia, Spanish Government (national)        |
| 2005-2006 | <b>Bachelor grant "Beca de Excelencia"</b><br>Comunidad de Madrid, Madrid, Spain (regional)   |
| 2004-2005 | <b>Bachelor grant "Beca de Excelencia"</b><br>Comunidad de Madrid, Madrid, Spain (regional)   |

## SCIENTIFIC DIVULGATION

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- |      |  |
|------|--|
| 2017 | <b>Article "Termodinàmica Estocàstica: un camp científic emergent"</b><br>Notices per a Químics" |
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Col·legi de Químics de Catalunya

## SUMMER SCHOOLS

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- 2019      **London Mathematical Laboratory (LML) summer school**  
ICTP, Trieste, Italy  
July 8 - August 2  
Project supervisor (with Rosemary J. Harris)
- 2012      **"II Gefenol Summer School on Statistical Physics of Complex and Small Systems"**  
Centro de Ciencias de Benasque Pedro Pascual, Benasque, Spain  
September 3-4  
PhD student
- 2011      **"Summer School on Statistical Physics of Complex and Small Systems"**  
IFISC, Palma de Mallorca, Spain  
September 12-23  
PhD student

## OTHERS

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Referee for the American Physical Society (APS) since 2015

Scientific referee for: Nature Communications, Physical Review X, Physical Review Letters, Physical Review E, New Journal of Physics, Journal of Chemical Physics, EPL (Distinguished Referee 2017), European Physical Journal B, Physica A, Entropy

Spoken languages: English (fluent oral and written), Spanish (native), Italian (intermediate level), French (intermediate level), German (beginner level)

Programming: C, C++, Python, MATLAB, Mathematica