

CV date	22/05/2026
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Part A. PERSONAL INFORMATION

First name	ANTONIO
Family name	PRADOS MONTAÑO

A.1. Current position

Position	Catedrático de Universidad (Full Professor)
Initial date	15/12/2017
Institution	Universidad de Sevilla
Keywords	Non-equilibrium statistical mechanics; stochastic thermodynamics; Markov processes; optimal protocols; memory effects; information theory

A.2. Previous professional status (including breaks in research career, according to what is indicated in the call, indicate total months)

Period	Position/Institution/Country/Interruption cause
2002-2017	Prof. Titular de Universidad (Associate Professor)/ Univ. Sevilla/ Spain/ Promotion to Full Professor
2017	Chercheur (Researcher)/ CNRS/ France/ Fixed-term contract
1993-2002	Prof. Asociado Tiempo Completo (Lecturer)/ Univ. Sevilla/ Spain/ Promotion to Associate Professor
1990-1993	Becario FPI “Subprograma General” (FPI fellowship “General Subprogramme”)/ Univ. Sevilla/ Spain/ Obtention of PhD (27/11/1993)

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
PhD in Physics	Univ. Sevilla/ Spain	1993
Degree (“Licenciatura”) in Physics	Univ. Sevilla/ Spain	1989

Part B. CV SUMMARY (*max. 5000 characters, including spaces*)

I obtained the Degree (“Licenciatura”) in Physics from the University of Seville (US), with an average score of 3.71/4 (1989, National Award (1st)). I obtained my PhD in Physics from US (1993, Award to the best PhD Thesis).

I was a fellow of the national programme for “General Promotion of Knowledge” (now FPU) during my PhD (1990-93). Later, I was Lecturer (“Profesor Asociado”, 1993-2002) and Associate Professor (“Profesor Titular de Universidad”, 2002-2017) at US. Since 2017, I am a Full Professor (“Catedrático de Universidad”) of Theoretical Physics at US. Also, I am the head of the FQM-392 group *Interdisciplinary and Non-Equilibrium Physics (FINE)* of PAIDI (Junta de Andalucía), with 7 researchers.

I have given invited seminars at different Spanish (Málaga, Carlos III de Madrid, Extremadura, CSIC) and foreign (Paris-Saclay, La Sapienza) institutions. I have made short stays (less than a month) at the Carlos III (UC3M), Extremadura, Paris-Saclay, and La Sapienza Universities, and several longer stays at Paris-Saclay: 2013 (4 months), 2017 (1 month), 2019 (1 month), 2022 (1 month).

My scientific career has focused on different aspects of non-equilibrium statistical mechanics. I have usually employed a mesoscopic description, starting from simple models that allow for obtaining exact–or controlled approximate—analytical results. In a first stage (1990-98) that includes my PhD, my central research field was structural glasses and stochastic resonance. In a second stage (1999-2008), I focused on dense granular systems, analysing phenomena like compaction and segregation. In a third stage (2009-), I have diversified my interests and created a stable network of international collaborations with top-level scientists, like E. Trizac (Paris-Saclay and ENS Lyon), D. Guéry-Odelin (Toulouse), and C. Jarzynski (Maryland). This has allowed me to open new lines of research, e.g. optimisation problems

in stochastic thermodynamics, out-of-equilibrium memory effects, stochastic resetting, or information theory.

I have authored ~90 papers in international journals, roughly 80% in Q1 (Scopus, JCR). I have ~40 communications, among which invited talks in: (i) XXIII Sitges Conference on Statistical Mechanics (2012), (ii) La Sapienza (2015), (iii) Banff International Research Station (2016), (iv) Fields Institute (2018), (v) Centro Ennio de Giorgi (2022), (vi) XXVII Sitges Conference on Statistical Mechanics (2023). I have been a member of the organising committee of 3—1 international, 2 national—congresses. I have participated in 25 research projects funded by competitive calls, in 7 of them as principal investigator and 1 of them as guarantor. Currently I am involved in two (see C.3 for details): (i) *Thermodynamics of mesoscopic systems: optimal control, search processes and information devices*, funded by Agencia Estatal de Investigación, and (ii) *Multiscale approach to energy efficiency: from the nucleus to the macroscale*, funded by US. I am acting as PI in (i) and as founder guarantor of the associated *Excellence Unit “Multidisciplinary Unit for Energy Science”* in (ii), recently approved by US (12/2024).

I have supervised nine (six completed, three ongoing) PhD students. Six of the nine PhD students have had FPU fellowships; of the three PhD thesis in progress, two of them have FPU funding. All my former PhD students are currently in academia with different positions, from competitive postdocs (A. Patrón at Simon Fraser Univ., G. García-Valladares at Sorbonne Univ.) to tenure-track (M. Ruiz-García at UCM) and permanent positions (A. Lasanta at UGR, C. A. Plata and B. Sánchez-Rey at US). The skills that they developed under my supervision, both related to mathematics—perturbative methods, variational calculus, control theory...—and to physics—building of simple models, derivation of exact or approximate evolution equations, systematic analysis thereof...—have contributed to their success. Also, I have supervised ~20 master and bachelor theses, some of these students later joined our group for their PhD.

I am involved in evaluation activities at different levels. I am an active referee for many journals: PRL, PRE, JSTAT, JPA... with more than 100 reports (99th percentile at [Publons](#)). I have received several awards for my refereeing activity: “Outstanding Referee” (APS, 2022), “Distinguished Referee” (EPS, 2022), “Trusted Reviewer” (IOP, 2024). I am member of the editorial board of Entropy (2020-), currently Q2 in JCR Physics, Multidisciplinary. I am member of the panel of reviewers of the Agencia Estatal de Investigación (Spain) since 2019, and I also have evaluated projects of its foreign counterparts for several countries (Argentina, Israel). I have also acted as external evaluator of PhD theses for La Sapienza and of Associate Professor positions for Ben-Gurion Univ. About management activities, I am currently the academic coordinator of the PhD programme “Ciencias y Tecnologías Físicas” at US.

Part C. RELEVANT MERITS

C.1. Publications

1. N. Ruiz-Pino and A. Prados, Entropic balance with feedback control: information equalities and tight inequalities, *Phys. Rev. Lett.* **136**, 067101 (2026).[link](#)
2. M. Baldovin, I. Ben Yedder, C. A. Plata, D. Raynal, L. Rondin, E. Trizac, and A. Prados, Optimal control of levitated nanoparticles through finite-stiffness confinement, *Phys. Rev. Lett.* **135**, 097102 (2025).[link](#)
3. C. Ríos-Monje, C. A. Plata, D. Guéry-Odelin, and A. Prados, Optimal synchronisation to a limit cycle, *Chaos* **34**, 103146 (2024).[link](#)
4. D. Guéry-Odelin, C. Jarzynski, C. A. Plata, A. Prados, and E. Trizac, Driving rapidly while remaining in control: classical shortcuts from Hamiltonian to stochastic dynamics, *Rep. Prog. Phys.* **86**, 035902 (2023).[link](#)
5. A. Megías, A. Santos, and A. Prados, Thermal versus entropic Mpemba effect in molecular gases with nonlinear drag, *Phys. Rev. E* **105**, 054140 (2022).[link](#)
6. A. Patrón, B. Sánchez-Rey, and A. Prados, Strong nonexponential relaxation and memory effects in a fluid with nonlinear drag, *Phys. Rev. E* **104**, 064127 (2021).[link](#)
7. C. A. Plata, A. Prados, E. Trizac, and D. Guéry-Odelin, Taming the time evolution in overdamped systems: shortcuts elaborated from fast-forward and time-reversed protocols, *Phys. Rev. Lett.* **127**, 190605 (2021).[link](#)

8. A. Prados, Optimizing the relaxation route with optimal control, *Phys. Rev. Research* **3**, 023128 (2021).[link](#)
9. C. A. Plata, D. Guéry-Odelin, E. Trizac, and A. Prados, Building an irreversible Carnot-like heat engine with an overdamped harmonic oscillator, *J. Stat. Mech.* 093207 (2020).[link](#)
10. C. A. Plata, D. Guéry-Odelin, E. Trizac, and A. Prados, Optimal work in a harmonic trap with bounded stiffness, *Phys. Rev. E* **99**, 012140 (2019).[link](#)
11. M. Baldovin, A. Vulpiani, A. Puglisi, and A. Prados, Derivation of a Langevin equation in a system with multiple scales: the case of negative temperatures, *Phys. Rev. E* **99**, 060101(R) (2019).[link](#)
12. C. A. Plata, Z. N. Scholl, P. E. Marszalek, and A. Prados, Relevance of the speed and direction of pulling in simple modular proteins, *J. Chem. Theory Comput.* **14**, 2910-2918 (2018).[link](#)
13. A. Lasanta, F. Vega Reyes, A. Prados and A. Santos, When the hotter cools more quickly: Mpemba effect in granular fluids, *Phys. Rev. Lett.* **119**, 148001 (2017).[link](#)
14. A. Prados and E. Trizac, Kovacs-like memory effect in driven granular gases, *Phys. Rev. Lett.* **112**, 198001 (2014).[link](#)
15. A. Prados, A. Lasanta and P. I. Hurtado, Large fluctuations in driven dissipative media, *Phys. Rev. Lett.* **107**, 140601 (2011).[link](#)

C.2. Congress

1. Invited talk: *Swift state-to-state transformations in systems with stochastic dynamics*. Seminars of the Physics Department. Tongji University, Shanghai, China. 2024
2. Invited talk: *Beating the natural timescale for relaxation with optimal control*. XXVII Sitges Conference on Statistical Mechanics. Sitges, Spain. 2023.
3. Invited talk: *Swift state-to-state transformations in stochastic systems*. Seminars of ICMM-CSIC. ICMM-CSIC, Madrid, Spain, 2023.
4. Invited talk: *Beating the natural timescale for relaxation with optimal control*. Boltzmann Equation and Irreversibility: after 150 years an evergreen problem. Pisa, Italy. 2022.
5. Contributed talk: *Mpemba effect in molecular fluids: a kinetic theory approach* (with A. Patrón, B. Sánchez-Rey, A. Megías, and A. Santos). APS March Meeting. USA (Online, due to the COVID19 pandemic). 2021.
6. Contributed talk: *Building and optimising finite-time adiabatic processes in stochastic thermodynamics*. Optimal design of soft matter. Isaac Newton Institute, Cambridge, UK. 2019.
7. Invited talk: *The unfolding pathway of simple modular proteins: a not-so-easy problem*. Workshop Modelling biological phenomena: from nano to macro scales. Fields Institute, Toronto, Canada. 2018.
8. Invited talk: *Spin-string and spin-membrane models: A mesoscopic approach to rippling and buckling in graphene*. Challenges in Nonlinear Systems. Universidad Carlos III de Madrid, Leganés. 2017.
9. Invited talk: *Pulling of biomolecules: lessons from toy models*. Coupled Mathematical Models for Physical and Biological Nanoscale Systems and Their Applications. BIRS, Banff, Canada. 2016.
10. Invited talk: *Pulling experiments of biomolecules: what can be learnt from simple models*. Statistical Mechanics of non-Hamiltonian systems. Univ. La Sapienza, Rome, Italy. 2015.
11. Invited talk: *Kovacs-like effect in glassy systems and uniformly heated granular gases*. Seminars of the Physics Department, Univ. La Sapienza, Rome, Italy. 2014.
12. Invited talk: *Fluctuating hydrodynamics and large deviation function for driven dissipative systems*. XXIII Sitges Conference on Statistical Mechanics. Sitges, Spain. 2012.
13. Invited talk: *Fluctuations and linear response in a closed model for tapped granular media*. Granular Fluids: A Proving Ground for Nonequilibrium Statistical Mechanics. Seville, Spain. 2007.

C.3. Research projects

1. Role: PI.

Termodinámica de sistemas mesoscópicos: control óptimo, procesos de búsqueda y dispositivos de información (Termesis) Reference: PID2024-155268NB-I00. Duration: 09/2025-08/2029. Funding agency: Agencia Estatal de Investigación. PI: Antonio Prados Montaña. Budget: 52.500,00 €.

2. Role: Guarantor (of the associated Excellence Unit “Multidisciplinary Unit for Energy Science”). *Multiscale approach to energy efficiency: from the nucleus to the macroscale*. Reference: SOL2024-31833. Duration: 01/2025-12/2027. Funding agency: Universidad de Sevilla. PI: Victorino Franco García. Budget: 81.130,00 €.

3. Role: PI.

Estrategias óptimas en no equilibrio: teoría y aplicaciones (Soneto). Reference: PID2021-122588NB-I00. Duration: 09/2022-08/2025. Funding agency: Agencia Estatal de Investigación. PI: Antonio Prados Montaña. Budget: 54.450,00 €.

4. Role: PI.

Non-equilibrium systems: from control to complex response (Nestor). Reference: PROYEXCEL_00796. Duration: 02/2022-12/2025. Funding agency: Junta de Andalucía, Consejería de Transformación Económica, Industria, Conocimiento y Universidades. PI: Antonio Prados Montaña. Budget: 164.496,00 €.

5. Role: PI.

Optimality and Resetting: Investigation On Nonequilibrium (Orion). Reference: MSCA 101065902. Duration: 10/2022-09/2024. Funding agency: Horizon Europe, European Commission. PIs: Carlos A. Plata Ramos and A. Prados. Budget: 181.152,96 €.

6. Role: PI.

Funcionalización superficial y modelos de difusión de factores de germinación en semillas tratada con plasmas (Plasmaseed). Reference: US-1381045. Duration: 01/2021-12/2022. Funding agency: Junta de Andalucía PAIDI 2020. PIs: Profs. María del Carmen López Santos y Antonio Prados Montaña. Budget: 79.866,63 €.

7. Role: PI.

Procesos Fuera del Equilibrio: de los Efectos de Memoria a la Optimización de Nanomáquinas (Promenade). Reference: PGC2018-093998-B-I00. Duration: 01/2019-12/2021, extended up to 09/2022. Funding agency: Agencia Estatal de Investigación. PI: Prof. Antonio Prados Montaña. Budget: 24.200 €.

8. Role: Researcher.

Red de Física Estadística de no-equilibrio y sus aplicaciones multidisciplinares. Reference: FIS2016-82028-REDT. Duration: 07/2017-06/2019. Funding agency: Agencia Estatal de Investigación. PI: Prof. Miguel Rubí Capaceti (Univ. Barcelona). Budget: 18.500 €.

9. Role: Researcher.

Red de Física Estadística de no equilibrio y sus aplicaciones multidisciplinares. Reference: FIS2014-57117-REDT. Duration: 12/2014-11/2016. Funding agency: Ministerio de Economía y Competitividad. PI: Prof. Miguel Rubí Capaceti (Univ. Barcelona). Budget: 30.000 €.

10. Role: Researcher.

Flowing Matter. Reference: COST Action MP1305. Duration: 2014-2018. Funding Agency: European Union. PI: Prof. Federico Toschi (Eindhoven Univ. of Technology, Netherlands). Budget: 668.000 €.