

Asier López-Gordón

PREDOCTORAL RESEARCHER

Instituto de Ciencias Matemáticas (CSIC-UAM-UC3M-UCM)
Calle Nicolás Cabrera, 13-15, Campus Cantoblanco, UAM, 28049 Madrid, Spain

✉ asier.lopez@icmat.es | 🌐 alopezgordon.xyz | ☎ 0000-0002-9620-9647

Education

Universidad Autónoma de Madrid

Madrid, Spain

PHD MATHEMATICS

2021 -

- PhD thesis: The geometry of dissipation
- Advisor: Manuel de León

Universidad Autónoma de Madrid

Madrid, Spain

MSc THEORETICAL PHYSICS

2020 - 2021

- MSc thesis: The geometry of Rayleigh dissipation (arXiv:[2107.03780](https://arxiv.org/abs/2107.03780))
- Advisor: Manuel de León

Universidad Complutense de Madrid

Madrid, Spain

BSc PHYSICS

2016 - 2020

- BSc thesis: Integrability, chaos and entanglement in quantum systems
- Advisors: Federico Finkel and Artemio González-López

Professional Experience

2021- **Predoctoral researcher**, Instituto de Ciencias Matemáticas (ICMAT-CSIC), Madrid, Spain

2020-2021 **"JAE Intro" research grantee**, Instituto de Ciencias Matemáticas (ICMAT-CSIC), Madrid, Spain

Publications

JOURNAL ARTICLES

- J. Gaset, A. López-Gordón and X. Rivas, "Symmetries, conservation and dissipation in time-dependent contact systems", *Fortschritte der Phys.* (to appear), [arXiv:2212.14848](https://arxiv.org/abs/2212.14848) [math-ph].
- M. de León, M. Lainz, A. López-Gordón and X. Rivas, "Hamilton-Jacobi theory and integrability for autonomous and non-autonomous contact systems", *J. Geom. Phys.* **187** (Feb. 2023), doi: [10.1016/j.geomphys.2023.104787](https://doi.org/10.1016/j.geomphys.2023.104787).
- L. Colombo, M. de León and A. López-Gordón, "Contact Lagrangian systems subject to impulsive constraints", *J. Phys. A: Math. Theor.* **55**(42) (Oct. 2022), doi: [10.1088/1751-8121/ac96de](https://doi.org/10.1088/1751-8121/ac96de).
- M. de León, M. Lainz and A. López-Gordón, "Discrete Hamilton-Jacobi theory for systems with external forces", *J. Phys. A: Math. Theor.* **55**(20) (Mar. 2022), doi: [10.1088/1751-8121/ac6240](https://doi.org/10.1088/1751-8121/ac6240).
- M. de León, M. Lainz and A. López-Gordón, "Geometric Hamilton-Jacobi theory for systems with external forces", *J. Math. Phys.* **63**, p. 022901 (Feb. 2022), doi: [10.1063/5.0073214](https://doi.org/10.1063/5.0073214).
- M. de León, M. Lainz and A. López-Gordón, "Symmetries, constants of the motion, and reduction of mechanical systems with external forces", *J. Math. Phys.* **62**, p. 042901 (Apr. 2021), doi: [10.1063/5.0045073](https://doi.org/10.1063/5.0045073).

CONFERENCE PAPERS

- M. de León, M. Lainz, A. López-Gordón and J. C. Marrero, "Nonholonomic brackets: Eden revisited", Geometric Science of Information 2023 (to appear), [arXiv:2303.03002](https://arxiv.org/abs/2303.03002) [math-ph].
- A. A. Simoes, A. López-Gordón, A. Bloch and L. Colombo, "Discrete Mechanics and Optimal Control for a Passive Walker Experiencing Foot Slip", 2023 American Control Conference (to appear), [arXiv:2209.14255](https://arxiv.org/abs/2209.14255) [eess.SY].
- A. López-Gordón, L. Colombo and M. de León, "Nonsmooth Herglotz principle", 2023 American Control Conference (to appear), [arXiv:2208.02033](https://arxiv.org/abs/2208.02033) [math.OC].

M. E. E. Irazú, A. López-Gordón, L. J. Colombo and M. de León, “Hybrid Routhian reduction for simple hybrid forced Lagrangian systems”, 2022 European Control Conference (ECC), pp. 345-350 (July 2022), doi: [10.23919/ECC55457.2022.9838077](https://doi.org/10.23919/ECC55457.2022.9838077).

PREPRINTS

- L. Colombo, M. de León, M. Lainz and A. López-Gordón, “Liouville-Arnold theorem for contact Hamiltonian systems” (Feb. 2023), [arXiv:2302.12061](https://arxiv.org/abs/2302.12061) [math.SG].
- L. Colombo, M. de León, M. E. Eyrea Irazú and A. López-Gordón, “Geometric Hamilton-Jacobi theory and integrability for nonholonomic and forced hybrid systems” (Nov. 2022), [arXiv:2211.06252](https://arxiv.org/abs/2211.06252) [math-ph].
- L. J. Colombo, M. de León, M. E. Eyrea Irazú and A. López-Gordón, “Generalized hybrid momentum maps and reduction by symmetries of forced mechanical systems with inelastic collisions” (June 2022), [arXiv:2112.02573](https://arxiv.org/abs/2112.02573) [eess.SY].

IN PREPARATION

- J. de Lucas and A. López-Gordón, “Dissipation, stability, and contact Hamiltonian systems”.
- M. de León, A. Ibort, M. Lainz, A. López-Gordón and J. C. Marrero, “Quantization of nonholonomic systems”.

Awards, Fellowships, & Grants

2021	“FPI” predoctoral contract, Ministerio de Ciencia e Innovación	
	“JAE Intro” Grant extension, Instituto de Ciencias Matemáticas (ICMAT)	3 000 €
2020	“JAE Intro” Grant, Consejo Superior de Investigaciones Científicas (CSIC)	3 000 €
2019	“Beca de Colaboración en Departamentos”, Universidad Complutense de Madrid	2 000 €

Talks and Posters

CONTRIBUTED TALKS

- March 29, 2023. **17th International Young Researchers Workshop on Geometry, Mechanics and Control.** *Liouville-Arnold theorem for contact Hamiltonian systems.* KU Leuven, Leuven, Belgium.
- February 6, 2023. **VI Congreso de Jóvenes Investigadores de la Real Sociedad Matemática Española.** *Integrability of contact Hamiltonian systems.* Universidad de León, León, Spain.
- January 19, 2023. **XXIV Encuentro de Invierno en Geometría, Mecánica y Control.** *Symmetries, conservation and dissipation in time-dependent contact systems.* Universidad de Zaragoza, Zaragoza, Spain.
- January 6, 2023. **Workshop on Nonlinear Systems III.** *Symmetries, conservation and dissipation in time-dependent contact systems.* Gebze Teknik Üniversitesi, Kocaeli, Turkey.
- September 1, 2022. **XXX International Fall Workshop in Geometry and Physics.** *Hamilton-Jacobi theory for contact systems: autonomous and non-autonomous.* Instituto de Ciencias Matemáticas (ICMAT-CSIC), Madrid, Spain.
- July 20, 2022. **34th International Colloquium on Group Theoretical Methods in Physics.** *Non-conservative systems can have conserved quantities! Symmetries, reduction and Hamilton-Jacobi theory for forced mechanical systems.* Strasbourg University, Strasbourg, France.
- July 13, 2022. **2022 European Control Conference.** *Hybrid Forced Lagrangian Systems.* Imperial College and University College, London, UK (online).
- July 5, 2022. **14th International Summer School on Geometry, Mechanics and Control.** *Reduction of forced mechanical systems with inelastic collisions.* Universidad de Burgos, Burgos, Spain.
- March 7-11, 2022. **VII Iberoamerican Meeting on Geometry, Mechanics and Control.** *Forced Hamiltonian and Lagrangian systems. Symmetries, reduction and Hamilton-Jacobi theory.* Departamento de Matemática, Universidad Nacional del Sur, Bahía Blanca, Argentina (online).
- September 8, 2021. **XXIX International Fall Workshop in Geometry and Physics.** *Mechanical systems with external forces. Symmetries, reduction and Hamilton-Jacobi theory.* Centro de Matemática e Aplicações, Universidade da Beira Interior, Covilhã, Portugal (online).

SEMINARS

May 11, 2023. **Geometry and Applications: Modern Mathematical Approaches (Gamma) Seminar.** *An introduction to integrable systems.* University of Warsaw, Warsaw, Poland (online).

April 1, 2022. **Geometry, Mechanics and Control Seminar.** *Reduction, Hamilton-Jacobi theory and discretization of mechanical systems with external forces.* Instituto de Ciencias Matemáticas, Madrid, Spain (online).

POSTERS

January 17-21, 2022. **Congreso Bienal de la Real Sociedad Matemática Española** (Biennial Congress of the Royal Spanish Mathematical Society). *Systems with external forces. Symmetries, reduction and Hamilton-Jacobi theory.* Universidad de Castilla – La Mancha, Ciudad Real, Spain.

December 1-3, 2021. **Young Researchers Workshop in Geometry, Mechanics and Control.** *Symmetries, reduction, Hamilton-Jacobi theory and discretization for systems with external forces.* Centre de Recerca Matemàtica, Campus de Bellaterra, Barcelona, Spain.

Assistance to scientific meetings

WORKSHOPS

February 6-10, 2023. **VI Congreso de Jóvenes Investigadores de la Real Sociedad Matemática Española.** Universidad de León, León, Spain.

January 19-20, 2023. **XXIV Encuentro de Invierno en Geometría, Mecánica y Control.** Universidad de Zaragoza, Zaragoza, Spain.

January 3-9, 2023. **Workshop on Nonlinear Systems III.** Gebze Teknik Üniversitesi, Kocaeli, Turkey.

December 12-16, 2022. **II Encuentro RSME-UMA.** Ronda, Spain.

August 29-September 2, 2022. **XXX International Fall Workshop in Geometry and Physics.** Instituto de Ciencias Matemáticas (ICMAT-CSIC), Madrid, Spain.

July 18-22, 2022. **34th International Colloquium on Group Theoretical Methods in Physics.** Strasbourg University, Strasbourg, France.

July 12-15, 2022. **2022 European Control Conference.** Imperial College and University College, London, UK (online).

May 23-26, 2022. **Geometric Aspects of the Swampland.** Centro de Física Teórica y Matemáticas, Madrid, Spain.

March 7-11, 2022. **VII Iberoamerican Meeting on Geometry, Mechanics and Control.** Departamento de Matemática, Universidad Nacional del Sur, Bahía Blanca, Argentina (online).

January 24-25, 2022. **XXIII Winter Meeting on Geometry, Mechanics and Control.** Universidad de Zaragoza, Zaragoza, Spain.

January 17-21, 2022. **Congreso Bienal de la Real Sociedad Matemática Española** (Biennial Congress of the Royal Spanish Mathematical Society). Universidad de Castilla – La Mancha, Ciudad Real, Spain.

December 1-3, 2021. **Young Researchers Workshop in Geometry, Mechanics and Control.** Centre de Recerca Matemàtica, Campus de Bellaterra, Barcelona, Spain.

September 7-10, 2021. **XXIX International Fall Workshop in Geometry and Physics.** Centro de Matemática e Aplicações, Universidade da Beira Interior, Covilhã, Portugal (online).

July 26-30, 2021. **Symposium on New Developments in Momentum Polytope Theory.** Instituto de Ciencias Matemáticas (ICMAT), Madrid, Spain (online).

February 18-19 2021. **XXII Winter Meeting on Geometry, Mechanics and Control.** Universidade de Santiago de Compostela, Santiago de Compostela, Spain (online).

December 1-3, 2020. **BYMAT Conference-Bringing Young Mathematicians Together.** Universitat de València and Universitat Politècnica de València, Valencia, Spain (online).

SCHOOLS

July 4-8, 2022. **14th International Summer School on Geometry, Mechanics and Control.** Universidad de Burgos, Burgos, Spain.

August 2-5, 2021. **Summer School on New Developments in Momentum Polytope Theory.** Instituto de Ciencias Matemáticas (ICMAT), Madrid, Spain (online).

June 21-July 9, 2021. **JAE School of Mathematics.** Instituto de Ciencias Matemáticas (ICMAT), Madrid, Spain.

January 25-February 5, 2021. **Master School on Geometry, Analysis and Applications.** Universidad de Cantabria, Santander, Spain (online).

September 7-9, 2020. **JAE School of Mathematics.** Instituto de Ciencias Matemáticas (ICMAT), Madrid, Spain (online).

July 1-5 2019. **I International School on Particle Physics and Cosmology.** Universidad Internacional Menéndez Pelayo, Santander, Spain.

OTHERS

June 1, 2022. **Conferencia Final Net4impact. Impacto Social De La Investigación Científica.** Instituto de Ciencias Matemáticas, Madrid, Spain.

Teaching Experience

	Matemáticas (Mathematics) , Teaching Assistant, Grado en Ciencia y Tecnología de los Alimentos, Doble Grado en Nutrición Humana y Dietética y CTA (Degree in Food Science and Technology, Double Degree in Human Nutrition and Dietetics and FST), Universidad Autónoma de Madrid	30 h
Winter 2022-23		
	Matemáticas (Mathematics) , Teaching Assistant, Grado en Bioquímica (Degree in Biochemistry), Universidad Autónoma de Madrid	30 h
Winter 2022-2023		

Outreach & Professional Development

ORGANIZATION OF SCIENTIFIC MEETINGS

Member of the Scientific Committee of the *5th BYMAT Conference*.

Organizer of the parallel session on *Differential Geometry, Mathematical Physics and Control Theory*, during the *VI Congreso de Jóvenes Investigadores de la Real Sociedad Matemática Española* at Universidad de León, León, Spain (February 9, 2023).

PEER REVIEW

International Journal of Geometric Methods in Modern Physics

Journal of Geometric Mechanics

Revista de la Real Academia de Ciencias Exactas, Físicas y Naturales. Serie A. Matemáticas

61st IEEE Conference on Decision and Control

PROFESSIONAL MEMBERSHIPS

Real Sociedad Matemática Española (Royal Spanish Mathematical Society)

Real Sociedad Española de Física (Spanish Royal Physics Society)

Languages

English. Advanced, C1 in the CEFR, 7.5 band score in IELTS Academic

Spanish. Mother tongue

Computer skills

Advanced. \LaTeX , GNU/Linux, Mathematica, Python

Basic. bash/shell, git, gnuplot, html, Julia, matlab, nginx, OriginLab, SciDAVis