



Ángel González-Prieto

Curriculum Vitae

Personal Information

Full Name José Ángel González Prieto
Birth Date 23rd October 1991

Education

- 2015–2018 **PhD. in Mathematics**, *Topological Quantum Field Theories for Character Varieties*.
Universidad Complutense de Madrid, Madrid,
Sobresaliente *cum laude* (Highest mark)
Advisors: Marina Logares and Vicente Muñoz.
- 2014–2015 **MSc. in Mathematics and Applications**,
Universidad Autónoma de Madrid, Madrid, *GPA*: 9.67/10
- 2009–2014 **Double Degree in Mathematics and Computer Sciences**,
Universidad Autónoma de Madrid, Madrid, *GPA*: 9.45/10 (*First-class*)
Major in Pure Mathematics and Computer Sciences

Positions

- 2021–Present **Profesor Ayudante Doctor (Assistant Professor)**,
Departamento de Álgebra, Geometría y Topología. Facultad de Ciencias Matemáticas.
Universidad Complutense de Madrid, Madrid
- 2021 **Profesor Ayudante Doctor (Assistant Professor)**,
Departamento de Matemáticas. Facultad de Ciencias.
Universidad Autónoma de Madrid, Madrid
- 2018–2021 **Ayudante (Research Assistant)**,
ETSI de Sistemas Informáticos (School of Engineering of Computer Systems).
Universidad Politécnica de Madrid, Madrid
- 2019 **Postdoctoral Research Associate**,
Instituto de Ciencias Matemáticas. Severo Ochoa Research Fellow.
Consejo Superior de Investigaciones Científicas, Madrid
June – December.
- 2015–2018 **Personal Investigador en Formación (Predoctoral Fellow)**,
Facultad de Ciencias Matemáticas
Universidad Complutense de Madrid, Madrid

Departamento de Álgebra, Geometría y Topología. Facultad de Ciencias Matemáticas.
Universidad Complutense de Madrid and Instituto de Ciencias Matemáticas.

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External Memberships

2021–Present **Member of the Instituto de Ciencias Matemáticas**, (*CSIC-UAM-UCM-UC3M*)

Awards

- 2021 **Premio Vicent Caselles de Investigación Matemática (Vicent Caselles Award)**. Real Sociedad Matemática Española and BBVA Foundation.
- 2021 **Premio Extraordinario de Doctorado (Extraordinary PhD Award)**. Facultad de Ciencias Matemáticas. Universidad Complutense de Madrid.
- 2018 **Winner of the II PhDay Mathematics**. Universidad Complutense de Madrid.
- 2018 **Winner of the I PhDay Mathematics**. Universidad Complutense de Madrid.
- 2009 **Premio Extraordinario de Bachillerato de la Comunidad de Madrid** (Extraordinary Undergraduate Award of the Region of Madrid). Speciality: Health Sciences.

Grants and Scholarships

- 2019 **"Severo Ochoa" Postdoctoral Research Fellowship**, *Instituto de Ciencias Matemáticas*. Consejo Superior de Investigaciones Científicas
- 2015–2018 **International "La Caixa" Fellowship for PhD. Studies at Spanish Universities**, *Universidad Complutense de Madrid*. Department of Algebra, Geometry and Topology, Advisors: Marina Logares and Vicente Muñoz
"La Caixa" Foundation
- 2014–2015 **Fellowship for the pursuit of Master's Degree Program in Mathematics and Applications**, *Department of Mathematics*, Universidad Autónoma de Madrid
- 2013–2014 **Collaboration Grant**, *Department of Mathematics*, Universidad Autónoma de Madrid, *Homological algebra with applications to the toral rank conjecture*
- 2013 **JAE Intro CP 2013**, Instituto de Ciencias Matemáticas, *Studies on the toral rank conjecture*. Supervisor: Marina Logares
- 2009–2014 **Excellence Scholarship**, Universidad Autónoma de Madrid, Obtained every year.

External Habilitations

- 2024 **Professor (Acreditación de Profesor Titular de Universidad)**
- 2021 **Associate Professor (Acreditación de Profesor Contratado Doctor)**
- 2021 **Private University Professor (Acreditación de Profesor de Universidad Privada)**
- 2020 **Assistant Professor (Acreditación de Profesor Ayudante Doctor)**

Academic Management

- 2022–Present **Vicedean of International and Institutional Affairs**, *Facultad de CC. Matemáticas. Universidad Complutense de Madrid*
- 2023 **Coordinator of the EvAU exam - Mathematics II**, *Universidad Complutense de Madrid*

2020-2021 **Elected member of the School Board (Junta de Escuela),**
ETSI de Sistemas Informáticos. Universidad Politécnica de Madrid

Research

Research Interest

My research lies in the interface between Complex Geometry, Algebraic Geometry and Theoretical Physics. I am especially focused on Topological Quantum Field Theories, Geometric Invariant Theory, representation theory and Hodge theory. Moreover, I am interested in Algebraic Topology, especially in higher category theory, functor calculus and knot theory. As a byproduct, I am interested in moduli spaces, mainly moduli spaces of Higgs bundles and flat connections, and their relation with character varieties, gauge theory and mirror symmetry. Additionally, I also work on theoretical Machine Learning, with special attention to the application of mathematical techniques. In particular, I research in Recommender Systems, particularly in beyond-accuracy models, as well as Deep Learning, Generative Adversarial Networks and Manifold Learning through geometric flows.

Publications

- [45] **Á. González-Prieto**, *Pseudo-quotients and their application to character varieties*, 2023, [doi:10.1142/S0219199723500098](https://doi.org/10.1142/S0219199723500098), [arXiv:1807.08540v3](https://arxiv.org/abs/1807.08540v3)
Communications in Contemporary Mathematics, 2350009.
- [44] **Á. González-Prieto and M. Logares**, *Character varieties over singular manifolds*, 2023, [doi:10.1007/s40687-023-00394-y](https://doi.org/10.1007/s40687-023-00394-y), [arXiv:1807.08540v3](https://arxiv.org/abs/1807.08540v3)
Research in the Mathematical Sciences 10, 32 (2023).
- [43] **Á. González-Prieto, J. Martínez and V. Muñoz**, *Geometry of $SU(3)$ -character varieties of torus knots*, 2023, [doi:10.1016/j.topol.2023.108586](https://doi.org/10.1016/j.topol.2023.108586), [arXiv:2207.09170](https://arxiv.org/abs/2207.09170)
Topology and its Applications.
- [42] **Á. González-Prieto**, *Quantization of algebraic invariants through Topological Quantum Field Theories*, 2023, [doi:10.1016/j.geomphys.2023.104849](https://doi.org/10.1016/j.geomphys.2023.104849), [arXiv:2206.00709](https://arxiv.org/abs/2206.00709)
Journal of Geometry and Physics 189, 104849.
- [41] **E. Talavera, G. Iglesias, Á. González-Prieto, A. Mozo, S. Gómez-Canaval**, *Data Augmentation techniques in time series domain: A survey and taxonomy*, 2023, [doi:10.1007/s00521-023-08459-3](https://doi.org/10.1007/s00521-023-08459-3), [arXiv:2206.13508](https://arxiv.org/abs/2206.13508)
Neural Computing and Applications 35, 10123–10145.
- [40] **J. Díaz, J. Pérez, C. Gallardo and Á. González-Prieto**, *Applying Inter-rater Reliability and Agreement in Grounded Theory Studies in Software Engineering*, 2023, [10.5281/zenodo.5034244](https://doi.org/10.5281/zenodo.5034244)
Journal of Systems and Software 195 (2023) 111520
- [39] **Á. González-Prieto and V. Muñoz**, *Motive of the SL_4 -character variety of torus knots*, 2022, [arXiv:2006.01810](https://arxiv.org/abs/2006.01810), [doi:10.1016/j.jalgebra.2022.06.008](https://doi.org/10.1016/j.jalgebra.2022.06.008)
Journal of Algebra 2022.
- [38] **Á. González-Prieto and V. Muñoz**, *Representation Varieties of Twisted Hopf Links*, 2022, [arXiv:2202.07090](https://arxiv.org/abs/2202.07090)[doi:10.1007/s00009-023-02300-w](https://doi.org/10.1007/s00009-023-02300-w)
Mediterranean Journal of Mathematics 20, 89.

- [37] **Á. González-Prieto and V. Muñoz**, *The point counting problem in representation varieties of torus knots*, 2022, [arXiv:2105.08945](https://arxiv.org/abs/2105.08945)
Montes Taurus J. Pure Appl. Math. 4 (3), 114–130, 2022.
- [36] **Á. González-Prieto, A. Brú, J. C. Nuño and J. L. González**, *Hybrid machine learning methods for risk assessment in gender-based crime*, 2022, [doi:10.1016/j.knosys.2022.110130](https://doi.org/10.1016/j.knosys.2022.110130)
Knowledge-Based Systems Volume 260, 2022.
- [35] **Á. González-Prieto, A. Mozo, S. Gómez-Canaval and E. Talavera**, *Improving the quality of generative models through Smirnov transformation*, 2022, [doi:10.1016/j.ins.2022.07.066](https://doi.org/10.1016/j.ins.2022.07.066), [arXiv:2110.15914](https://arxiv.org/abs/2110.15914)
Information Sciences 609 (2022), 1539-1566.
- [34] **A. Mozo, J. Morón-López, S. Vakaruk, Á. G. Pompa-Pernía, Á. González-Prieto, J. A. Pascual Aguilar, S. Gómez-Canaval and J. Manuel Ortiz**, *Chlorophyll soft-sensor: machine learning models for algae bloom predictions*, 2022, [doi:10.1038/s41598-022-17299-5](https://doi.org/10.1038/s41598-022-17299-5)
Sci. Rep. 12.1 (2022): 1-23.
- [33] **A. Mozo, Á. González-Prieto, A. Pastor, S. Gómez-Canaval and E. Talavera**, *Synthetic flow-based cryptomining attack generation through Generative Adversarial Networks*, 2022, [doi:10.1038/s41598-022-06057-2](https://doi.org/10.1038/s41598-022-06057-2)
Sci. Rep. 2022, 12, 2091.
- [32] **R. Lara-Cabrera, A. González, F. Ortega and Á. González-Prieto**, *Dirichlet Matrix Factorization: A Reliable Classification-based Recommender System*, 2022, [doi:12031223](https://doi.org/10.12031223)
Appl. Sci. 2022, 12(3).
- [31] **J. Bobadilla, F. Ortega, A. Gutiérrez and Á. González-Prieto**, *Deep Variational Models for Collaborative Filtering-based Recommender Systems*, 2022, [doi:10.1007/s00521-022-08088-2](https://doi.org/10.1007/s00521-022-08088-2)
Neural Computing and Applications.
- [30] **J. Bobadilla, A. Gutiérrez, S. Alonso, Á. González-Prieto**, *Neural Collaborative Filtering Classification Model to Obtain Prediction Reliabilities*, 2022, [doi:10.9781/ijimai.2021.08.010](https://doi.org/10.9781/ijimai.2021.08.010)
International Journal of Interactive Multimedia and Artificial Intelligence 7 (4), 2022.
- [29] **J. Pérez, J. Díaz, J. Berrocal, R. López-Viana and Á. González-Prieto**, *Edge Computing – A Grounded Theory Study*, 2022, [doi:10.1007/s00607-022-01104-2](https://doi.org/10.1007/s00607-022-01104-2)
Computing, 1-37
- [28] **F. Ortega, R. Lara-Cabrera, Á. González-Prieto and J. Bobadilla**, *Providing reliability in recommender systems through Bernoulli matrix factorization*, 2021, [doi:10.1016/j.ins.2020.12.001](https://doi.org/10.1016/j.ins.2020.12.001)
Information Sciences, 553 110–128.
- [27] **J. Bobadilla, Á. González-Prieto, F. Ortega and R. Lara-Cabrera**, *Deep Learning Approach to Obtain Collaborative Filtering Neighborhoods*, 2021, [doi:10.1007/s00521-021-06493-7](https://doi.org/10.1007/s00521-021-06493-7)
Neural Computing and Applications 2021.

- [26] **Á. González-Prieto, A. Mozo, E. Talavera and S. Gómez-Canaval**, *Dynamics of Fourier Modes in Torus Generative Adversarial Networks*, 2021, doi:10.3390/math9040325
Math. 2021, 9, 325.
- [25] **J. Bobadilla, R. Lara-Cabrera, Á. González-Prieto and F. Ortega**, *Deep-Fair: Deep learning for improving fairness in recommender systems*, 2021, doi:10.9781/ijimai.2020.11.001
International Journal of Interactive Multimedia and Artificial Intelligence 2021.
- [24] **D. López-Fernández, J. Díaz, J. García, J. Pérez and Á. González-Prieto**, *DevOps Team Structures: Characterization and Implications*, 2021, doi:10.1109/TSE.2021.3102982arXiv:2101.02361
IEEE Transactions on Software Engineering 48 (10), 01.
- [23] **J. Pérez, Á. González-Prieto, D. López-Fernández, J. Díaz, J. García and A. Yagüe**, *DevOps Research-based Teaching Using Qualitative Research and Inter-Coder Agreement*, 2021, doi:10.1109/TSE.2021.3092705
IEEE Transactions on Software Engineering 48.9 (2021): 3378-3393.
- [22] **Á. González-Prieto**, *Virtual classes of parabolic $SL_2(\mathbb{C})$ -character varieties*, 2020, doi:10.1016/j.aim.2020.107148. arXiv:1906.05222
Advances in Mathematics, 368, 107148.
- [21] **Á. González-Prieto, M. Logares and V. Muñoz**, *A lax monoidal Topological Quantum Field Theory for representation varieties*, 2020, doi:10.1016/j.bulsci.2020.102871, arXiv:1709.05724
Bulletin des Sciences Mathématiques 2020, Vol. 161, 102871.
- [20] **J. Bobadilla, Á. González-Prieto, F. Ortega and R. Lara-Cabrera**, *Deep learning feature selection to unhide demographic recommender systems factors*, 2020, arXiv:2006.12379. doi:10.1007/s00521-020-05494-2
Neural Computing and Applications, 1-18.
- [19] **R. Lara-Cabrera, Á. González-Prieto, F. Ortega**, *Deep Matrix Factorization approach for Collaborative Filtering Recommender Systems*, 2020, doi:10.3390/app10144926
Applied Sciences 2020, 10(14), 4926.
- [18] **F. Ortega, Á. González-Prieto, J. Bobadilla and A. Gutiérrez**, *Collaborative filtering to predict sensor array values in large IoT networks*, 2020, doi:10.3390/s20164628
Sensors 2020, 20(16), 4628.
- [17] **R. Lara-Cabrera, Á. González-Prieto, F. Ortega and J. Bobadilla**, *Evolving matrix factorization based collaborative filtering using genetic programming*, 2020, doi:10.3390/app10020675
Applied Sciences 2020, 10(2), 675.
- [16] **Á. González-Prieto, J. Pérez, J. Díaz and D. López-Fernández**, *Inter-Coder Agreement for Improving Reliability in Software Engineering Qualitative Research*, 2020, arXiv:2008.00977doi:10.1016/j.jss.2023.111707
Journal of Systems and Software 202.

- [15] **J. Diaz, D. López-Fernández, J. Perez, Á. González-Prieto**, *Why are many businesses instilling a DevOps culture into their organization?*, 2020, [doi:10.1007/s10664-020-09919-3](https://doi.org/10.1007/s10664-020-09919-3). [arXiv:2005.10388](https://arxiv.org/abs/2005.10388)
Empirical Software Engineering 26(2), 1-50.

Books

- [14] **V. Muñoz, Á. González-Prieto and J. Rojo**, *Geometry and Topology of Manifolds: Surfaces and Beyond*, 2020, ISBN: 978-1-4704-6132-4
American Mathematical Society (Graduate Studies in Mathematics)

Book chapters (with peer-review)

- [13] **Á. González-Prieto, M. Logares, J. Martínez and V. Muñoz**, *Stratification of $SU(r)$ -character varieties of twisted Hopf links*, 2023, [arXiv:2303.06218](https://arxiv.org/abs/2303.06218)
Contemporary Mathematics of the American Mathematical Society (Accepted).
- [12] **Á. González-Prieto, M. Logares and V. Muñoz**, *Motive of the representation varieties of torus knots for low rank affine groups*, 2021, [arXiv:2104.13651](https://arxiv.org/abs/2104.13651)
Analysis, Geometry, Nonlinear optimization and Applications (Th.M. Rassias, P. Pardalos eds.), World Scientific (Accepted).
- [11] **Á. González-Prieto, M. Logares and V. Muñoz**, *Representation variety for the rank one affine group*, 2021, [arXiv:2005.01841](https://arxiv.org/abs/2005.01841)
Mathematical Analysis in Interdisciplinary Research (I.N. Parasidis, E. Providas and Th.M. Rassias, eds.), Springer.
- [10] **Á. González-Prieto**, *Deligne-Hodge polynomials of character varieties of doubly periodic instantons*, 2016, ISBN: 978-84-8344-525-9
Ediciones UAM.

Conference proceedings

- [9] **Á. González-Prieto and V. Muñoz**, *Character varieties of torus knots*, 2021
In: TEMatmonográficos, 2 (2021): Proceedings of the 3rd BYMAT Conference, pp. 39-42.

Editorials

- [8] **D. Pérez-López, J. Dueñas-Lerín, F. Ortega and Á. González-Prieto**, *New Trends in Artificial Intelligence for Recommender Systems and Collaborative Filtering*, 2023
Applied Sciences 2023.
- [7] **F. Ortega, Á. González-Prieto**, *Recommender Systems and Collaborative Filtering*, 2020, [doi:10.3390/app10207050](https://doi.org/10.3390/app10207050)
Applied Sciences 2020, 10(20), 7050.

Preprints

- [6] **Á. González-Prieto, J. Martínez and V. Muñoz**, *Character varieties of torus links*, 2024
Preprint [arXiv:2402.12286](https://arxiv.org/abs/2402.12286).
- [5] **Á. González-Prieto, Márton Hablicsek and Jesse Vogel**, *Arithmetic-Geometric Correspondence of Character Stacks via Topological Quantum Field Theory*, 2023
Preprint [arXiv:2309.15331](https://arxiv.org/abs/2309.15331).

- [4] **R. Lara-Cabrera, Á. González-Prieto, D. Pérez-López, D. Trujillo, F. Ortega**, *Manifoldy: An evaluation framework for dimensionality reduction through sectional curvature*, 2023
Preprint [arXiv:2303.09909](https://arxiv.org/abs/2303.09909).
- [3] **Á. González-Prieto, A. Gutiérrez, F. Ortega and R. Lara-Cabrera**, *ResBeMF: Improving Prediction Coverage of Classification based Collaborative Filtering*, 2022
Preprint [arXiv:2210.10619](https://arxiv.org/abs/2210.10619).
- [2] **Á. González-Prieto, Márton Hablicsek and Jesse Vogel**, *Virtual Classes of Character Stacks*, 2022
Preprint [arXiv:2201.08699](https://arxiv.org/abs/2201.08699).
- [1] **Á. González-Prieto**, *Motivic theory of character varieties via Topological Quantum Field Theories*, 2018
Preprint [arXiv:1810.09714](https://arxiv.org/abs/1810.09714).

Patents

- 2021 **A. Mozo, S. Gómez-Canaval, A. Pastor, D. López, E. Talavera and Á. González-Prieto**, *Method for modelling synthetic data in Generative Adversarial Networks*, European patent. Submitted 28/01/2021 (In evaluation)
Reference: EP 21382064.0

Research Projects

Principal Investigator

- 2022-Present **Topological recursion in character varieties and knot theory**, *Comunidad de Madrid R+D Project PR27/21-029*,
Principal Researcher: Ángel González-Prieto,
Universidad Complutense de Madrid

Participation as Researcher

- 2022-Present **Computational, dynamical and geometrical complexity in fluid dynamics**, *COMPLEXFLUIDS*,
Principal Researcher: Eva Miranda,
BBVA Foundation
- 2022-Present **Algebraic geometry and applications to mathematical physics**, *PID2021-124440NB-I00*,
Principal Researchers: Enrique Arrondo and Marina Logares,
Ministerio de Ciencia e Innovación (Universidad Complutense de Madrid)
- 2021 **H2020 SPIDER: a cyber security platform for virtualized 5G cyber range services**, *H2020 833685*,
Principal Researcher: Alberto Mozo,
Universidad Politécnica de Madrid
- 2021 **H2020 BOOST 4.0: Big data value spaces for competitiveness of European connected smart factories**,
Principal Researcher: Alberto Mozo,
European Research Council (Universidad Politécnica de Madrid)

- 2021 **H2020 Deep-Augur 2019**,
Principal Researcher: Alberto Mozo,
European Research Council (Universidad Politécnica de Madrid)
- 2015–2019 **"Severo Ochoa" Excellence Programme, SEV-2015-0554**,
Principal Researcher: Diego Córdoba Gazolaz,
Instituto de Ciencias Matemáticas
- 2015–2018 **Topology of Manifolds, Combinatorial Topology and Topological Dynamic, MTM2015-63612-P**, Principal Researchers: Vicente Muñoz and Francisco Romero,
Ministerio de Economía y Competitividad (Universidad Complutense de Madrid)
- 2015 **"Severo Ochoa" Excellence Programme, SEV-2011-0087**,
Principal Researcher: Diego Córdoba Gazolaz,
Instituto de Ciencias Matemáticas
- Innovative teaching projects**
- 2019–2020 **Training of Young University Professors in Mathematics. 2nd phase**, *Principal Researcher: Inés M^a Gómez Chacón*,
Universidad Complutense de Madrid
- 2018–2019 **Multidisciplinary problem-based teaching through the design, building, programming and automatic control of a drone**, *Principal Researcher: Jesús Bobadilla Sancho*,
Universidad Politécnica de Madrid
- 2018–2019 **Training of Young University Professors in Mathematics**, *Principal Researcher: Inés M^a Gómez Chacón*,
Universidad Complutense de Madrid
- R&D projects with companies**
- 2020 **Detection of hidden relations in black box testing**, *Coordinator: Raúl Lara-Cabrera*,
Universidad Politécnica de Madrid - Netzima

Teaching

- 2022–actual **Varietades Diferenciables**, (*Differentiable Manifolds*). *Degree in Mathematics*,
Facultad de Ciencias Matemáticas (Universidad Complutense de Madrid)
- 2023–2024 **Física: Mecánica y Ondas**, (*Physics: Mechanics and Waves*). *Degree in Mathematics*,
Facultad de Ciencias Matemáticas (Universidad Complutense de Madrid)
- 2023–2024 **Física: Modelos aplicados a la economía**, (*Physics: Models Applied to Economy*).
Double Degree in Mathematics and Statistics and Economy,
Facultad de Ciencias Matemáticas (Universidad Complutense de Madrid)
- 2022–2023 **Cálculo**, (*Calculus*). *Degree in Computer Science*,
Facultad de Informática (Universidad Complutense de Madrid)
- 2021–2022 **Física: Mecánica y Ondas**, (*Physics: Mechanics and Waves*). *Degree in Mathematics*,
Facultad de Ciencias Matemáticas (Universidad Complutense de Madrid)

- 2021–2022 **Física: Modelos aplicados a la economía**, (*Physics: Models Applied to Economy*).
Double Degree in Mathematics and Statistics and Economy,
 Facultad de Ciencias Matemáticas (Universidad Complutense de Madrid)
- 2021–2022 **Geometría Lineal**, (*Linear Geometry*). *Double Degree in Mathematics and Computer Science and Double Degree in Mathematics and Physics*,
 Facultad de Ciencias Matemáticas (Universidad Complutense de Madrid)
- 2020–2021 **Matemáticas II**, (*Mathematics II*). *Degree in Chemical Engineering*,
 Facultad de Ciencias (Universidad Autónoma de Madrid)
- 2020–2021 **Geometría de Curvas y Superficies**, (*Geometry of Curves and Surfaces*). *Degree in Mathematics*,
 Facultad de Ciencias (Universidad Autónoma de Madrid)
- 2020–2021 **Lógica para la Inteligencia Artificial**, (*Logic for Artificial Intelligence*). *Degree in Data Science and Artificial Intelligence*,
 ETSI de Sistemas Informáticos (Universidad Politécnica de Madrid)
 Coordinator
- 2020–2021 **Massively Parallel Machine Learning**, *Master in Digital Innovation: Data Science*,
 ETSI de Ingenieros Informáticos (Universidad Politécnica de Madrid)
- 2020–2021 **Bases de Datos**, (*Databases*). *Degree in Software Engineering*,
 ETSI de Sistemas Informáticos (Universidad Politécnica de Madrid)
- 2018–2020 **Fundamentos de Ingeniería del Software**, (*Fundamentals of Software Engineering*).
Degree in Software Engineering,
 ETSI de Sistemas Informáticos (Universidad Politécnica de Madrid)
- 2018–2019 **Programación de Hardware Reconfigurable**, (*Programming of Reconfigurable Hardware*). *Degree in Computer Engineering*,
 ETSI de Sistemas Informáticos (Universidad Politécnica de Madrid)
- 2018–2019 **Verificación y Validación**, (*Verification and Validation*). *Degree in Software Engineering*,
 ETSI de Sistemas Informáticos (Universidad Politécnica de Madrid)
- 2017–2018 **Geometría Computacional**, (*Computational Geometry*). *Double Degree in Mathematics and Computer Science and Degree in Mathematics*,
 Facultad de Ciencias Matemáticas (Universidad Complutense de Madrid)
- 2015–2018 **Geometría Diferencias y Aplicaciones**, (*Differential Geometry and Applications*).
Degree in Mathematical Engineering,
 Facultad de Ciencias Matemáticas (Universidad Complutense de Madrid)
- 2015–2017 **Elementos de Matemáticas y Aplicaciones**, (*Elements of Mathematics and Applications*). *Degree in Mathematics*,
 Facultad de Ciencias Matemáticas (Universidad Complutense de Madrid)
- 2014–2015 **Álgebra**, (*Algebra*). *Degree in Computer Science*,
 Facultad de Ciencias (Universidad Autónoma de Madrid)

Supervised PhD students

2022–present **Alejandro Calleja Arroyo**, *Geometry of character varieties of knots*, Supported by a FPI grant from Instituto de Ciencias Matemáticas (ICMAT)
Facultad de Ciencias Matemáticas (Universidad Complutense de Madrid).

2022–present **Soren Dyhr**, *Geometric fluid dynamics*, Joint advisory with Eva Miranda (UPC) and Daniel Peralta-Salas (ICMAT), Supported by a “La Caixa” Foundation INPhINIT grant
Universitat Politècnica de Catalunya.

Other supervised students

Additionally, more than 15 successfully defended Bachelor’s Thesis students and 4 Master’s Thesis students at different universities and institutions.

Publications about Mathematical Education

2020 **Inés María Gómez-Chacón et al.**, *Multimedia learning scenarios in professional development of the novice university mathematics lecturers (ESCEMMAT-Univ) (2nd Phase)*, E-Prints Complutense

2019 **Inés María Gómez-Chacón et al.**, *Multimedia learning scenarios in professional development of the novice university mathematics lecturers (ESCEMMAT-Univ)*, E-Prints Complutense

Others

2021 **CompuMates: \LaTeX** , Facultad de Ciencias Matemáticas, Universidad Complutense de Madrid
9 hours.

2021 **Machine Learning**, *Ericsson*, ETSI de Sistemas Informáticos, Universidad Politécnica de Madrid
56 hours.

2020–Present **Probability and Statistics for Machine Learning**, *Samsung*, ETSI de Sistemas Informáticos, Universidad Politécnica de Madrid
60 hours.

2019–2020 **Introduction to Mathematics and Statistics for Data Science**, Banco Santander, Ciudad Financiera and Santander Asset Management
June 2019 (14 hours), September 2019 (30 hours), November-December 2019 (18 hours) and May-June 2020 (15 hours).

2019 **Algebraic geometry from a holomorphic viewpoint**, Universidad Complutense de Madrid and Instituto de Matemática Interdisciplinar, Doctorate course
20 hours.

2018 **XII Modelling Week**, *Coordinator of a Working Group*, Universidad Complutense de Madrid, Drone flight via Artificial Intelligence
26 hours.

2016–2017 **Introduction to Sage**, Universidad Complutense de Madrid,
Sessions: ‘Basic programming’ and ‘Computational formal proofs’
4 hours.

Conferences and Talks

Invited speaker

- 2023 **V BYMAT Conference - Plenary speaker**, Instituto de Ciencias Matemáticas,
Quantum field theories in algebraic geometry
13th November 2023
- 2023 **XIV Ukraine Algebra Conference**, Institute of Mathematics of National Academy
of Ukraine (online),
Interference phenomena in Topological Quantum Field Theories for character varieties
6th July 2023
- 2023 **Algebra, Geometry and Number Theory seminar**, Leiden University,
Knotting bordisms: Topological Quantum Field Theories for character varieties of
knots
19th April 2023
- 2023 **Special day on representation theory in Geometry and Physics**, Universitat
Politècnica de Catalunya,
Character varieties of knots made easy
21st February 2023
- 2023 **Congreso de Jóvenes Investigadores RSME 2023**, Universidad de León,
Quantizability of manifold invariants
8th February 2023
- 2022 **IV BYMAT Conference**, Universitat de València,
Knots and Topological Quantum Field Theories
10th November 2022
- 2022 **Geometry Seminar**, Centre de Recerca Matemàtica,
Quantum sledgehammers to crack character nuts
18th May 2022
- 2022 **Geometry Seminar**, Centre de Recerca Matemàtica,
Quantum sledgehammers to crack character nuts
18th May 2022
- 2022 **TQFT Club Seminar**, University of Lisbon,
Topological Quantum Field Theories for Character Stacks
13rd April 2022
- 2022 **ALPE Seminar**, University of Montpellier,
Quantization of parabolic character varieties and interference phenomena
16th March 2022
- 2021 **b-Lab Seminar**, Universitat Politècnica de Catalunya,
Course: Topological Quantum Field Theories for Dummies
15 November 2021, 10 December 2021, 22 December 2021 and 28 January 2022
- 2021 **New Bridges between Mathematics and Data Science**, Universidad de Valladolid,
Recommender systems in action
10 November 2021

- 2021 **New Bridges between Mathematics and Data Science**, Universidad de Valladolid,
Generative Adversarial Networks for Mathematicians
9 November 2021
- 2021 **Antonio Giraldo and Sonia Sastre Seminar**, ETSI Ingenieros Informáticos, Univer-
sidad Politécnica de Madrid,
Motives of character varieties of torus knots
28 October 2021
- 2021 **Workshop of Young Researchers in Mathematics**, Faculty of Mathematical
Sciences, Universidad Complutense de Madrid,
Quantizing representation theory
20 September 2021
- 2021 **Machine Learning Seminar**, Universidad Autónoma de Madrid and Instituto de
Ciencias Matemáticas,
Dynamics of Generative Adversarial Networks
23 June 2021
- 2021 **Geometry Seminar**, Universidad Autónoma de Madrid and Instituto de Ciencias
Matemáticas,
Interference phenomena in parabolic character varieties
17 February 2021
- 2020 **III BYMAT Conference**, Universitat de València,
Character varieties of torus knots
1-3 December 2020
- 2020 **JAE School of Mathematics**, Instituto de Ciencias Matemáticas,
Homotopy of spaces of embeddings
7 - 8th September 2020 (3 hours)
- 2020 **Research Seminar**, ETSI de Sistemas Informáticos, Universidad Politécnica de
Madrid,
The discrete logarithm problem and elliptic curves cryptography
16th June 2020
- 2020 **III Jíbiri Seminar (Algebraic Geometry Workshop)**, Universidad de Málaga,
Course: Character varieties. 2,5 hours
5th - 7th February 2020
- 2020 **V Meeting of Young Researchers**, *Real Sociedad Matemática Española*, Universitat
Jaume I,
Interference phenomena in the moduli space of parabolic representations
30th January 2020
- 2019 **Workshop on Geometric Methods in Symplectic Topology**, Instituto de Ciencias
Matemáticas,
Homotopy groups of spaces of knots with bow, arrows and bordisms
16th December 2019

- 2019 **Seminar of Topological Quantum Field Theories**, University of Lisbon. Instituto Técnico Superior,
Topological recursion in the motivic theory of character varieties
27th November 2019
- 2019 **Seminar of Geometry and Topology**, Universidad de Málaga,
Bordisms as homotopy groups of knots
13th November 2019
- 2019 **Algebraic Geometry and Number Theory Seminar**, Institute of Science and Technology, Vienna, Austria,
Hodge theory of character varieties via Topological Quantum Field Theories
7th March 2019
- 2019 **Biennial Congress of the Real Sociedad Matemática Española**, Universidad de Cantabria,
Hodge theory via Topological Quantum Field Theories
4th February 2019
- 2018 **Algebra and Topology Seminar**, Department of Mathematical Sciences, University of Copenhagen,
Topological Quantum Field Theories for representation varieties
17th December 2018
- 2018 **XII Workshop of Young Researchers in Mathematics**, Faculty of Mathematical Sciences, Universidad Complutense de Madrid,
How to use a quantum sledgehammer to crack a topological nut (and to get something in return)
24th September 2018
- 2018 **Algebra, Geometry and Topology Seminar**, Faculty of Mathematical Sciences, Universidad Complutense de Madrid,
Algebraic topology through Topological Quantum Field Theories
7th June 2018
- 2018 **Mathematics PhD Seminar**, Faculty of Mathematical Sciences, Universidad Complutense de Madrid,
Algebraic quotients and Geometric Invariant Theory
10th May 2018
- 2018 **I BYMAT Conference**, Instituto de Ciencias Matemáticas,
Field theory and quantisation of Hodge structures
7th May 2018
- 2018 **Geometry for the future**, Instituto de Ciencias Matemáticas,
Topological Geometric Invariant Theory
16th April 2018
- 2018 **Seminari de Geometria Algebraica**, Universitat de Barcelona,
Topological Quantum Field Theories and their application to Hodge theory
5th April 2018

- 2018 **Junior Geometry Seminar (Geometry Tea)**, University of Cambridge,
Hodge structures through Topological Quantum Field Theory
23th February 2018
- 2018 **III Meeting of the Network of Algebraic Geometry and Singularities (RGAS)**,
Faculty of Mathematical Sciences, Universidad Complutense de Madrid,
Topological Quantum Field Theory for Hodge structures on character varieties
29th January 2018
- 2017 **Pure Mathematics Research Seminar**, Centre for Mathematical Sciences, University
of Plymouth,
Quantisation of Hodge structures of representation varieties
22th November 2017
- 2017 **Pure Mathematics Research Seminar**, Centre for Mathematical Sciences, University
of Plymouth,
Duality in Topological Quantum Field Theories
15th November 2017
- 2017 **Group Theory Seminar UAM-ICMAT**, Department of Mathematics, Universidad
Autónoma de Madrid,
Categorical methods for representation varieties
25th October 2017
- 2017 **Mathematics PhD Seminar of Universidad Autónoma de Madrid**, Department
of Mathematics, Universidad Autónoma de Madrid,
Topological Quantum Field Theories: A parade of monoidal functors
11th October 2017
- 2017 **Modern Moduli Theory Graduate School**, Mathematical Institute, University of
Oxford,
Lax quantum field theory for Deligne-Hodge polynomials of representation varieties
20th September 2017
- 2016 **Mathematics PhD Seminar of Universidad Complutense de Madrid**, Faculty of
Mathematical Sciences, Universidad Complutense de Madrid,
Hodge structures and monodromy
20th December 2016
- 2016 **X Workshop of Young Researchers in Mathematics**, Faculty of Mathematical
Sciences, Universidad Complutense de Madrid,
Gluing Hodge structures on character varieties
20th September 2016
- 2016 **Geometry and Topology Seminar**, Faculty of Mathematical Sciences, Universidad
Complutense de Madrid,
Geometric and algebraic tools in Hodge theory with a view towards character varieties
17th May 2016
- 2016 **Mathematics PhD Seminar of University of Oxford**,
Mathematical Institute, University of Oxford,
Mixed Hodge structures on parabolic character varieties via geometric methods
28th April 2016

- 2015 **Mathematics PhD Seminar of Universidad Complutense de Madrid**, Faculty of Mathematical Sciences, Universidad Complutense de Madrid,
Hodge structures via stratification of character varieties
29th October 2015 and 15th November 2015
- 2015 **Geometry Seminar**, Instituto de Ciencias Matemáticas,
Deligne-Hodge polynomials of character varieties of doubly periodic instantons
13th October 2015
- 2014 **I Young Seminar**, Instituto de Ciencias Matemáticas, Taught courses: The h-cobordism theorem, Derived functors and sheaf cohomology and Introduction to Hodge theory
23-27 June 2014
- 2012 **III Conferences about Sage/Python**, Universidad de Vigo,
Analyzing diplomatic cables of USA using Python
21-22 June 2012
- [Organizer](#)
- 2023–Present **Member of the Scientific Committee**, *VII Congreso de Jóvenes Investigadores de la Real Sociedad Matemática Española*, Universidad del País Vasco UPV/EHU
13-17 January 2025
- 2021–Present **Organizer of Mathematical Physics and Algebraic Geometry Seminar (MA-PHYAG)**, Universidad Complutense de Madrid
- 2021–Present **Organizer of Geometry Seminar**, Instituto de Ciencias Matemáticas
- 2022–2023 **Organizer of Reading Courses**, *Quantum groups*, Universidad Complutense de Madrid
- 2019–2020 **Organizer of Reading Courses**, *Representation theory of compact Lie groups*, Universidad Complutense de Madrid
- 2019 **Head of the Scientific Committee**, *II BYMAT Conference*, Instituto de Ciencias Matemáticas
20-24 May 2019
- 2018-2019 **Organizer of Reading Courses**, *Representation theory of finite groups*, Universidad Complutense de Madrid
20 hours
- 2018 **Organizer of II PhDay**, *Mathematics*, Universidad Complutense de Madrid
27 June 2018
- 2016–2018 **Organizer of the Network of PhD Students in Mathematics (ReDM)**, *Mathematics PhD seminar*, Universidad Complutense de Madrid
Course 2016/2017 and 2017/2018
- 2015 **Organizer of IV Workshop on Topological Groups**, Universidad Complutense de Madrid
3-4 December 2015
- 2014 **Organizer of the I Young Seminar**, Instituto de Ciencias Matemáticas
23-27 June 2014

Others

- 2020 **Speaker of Teaching Innovation Project**, *Use of specific software for creating Flipped Learning activities*, Universidad Complutense de Madrid
3 February 2020
- 2017 **Speaker at the II PhDay Complutense**, Universidad Complutense de Madrid, Scientific outreach contest. Winner
27 June 2017
- 2018 **Speaker at the Three Minute Thesis Complutense**, Universidad Complutense de Madrid, Scientific outreach
23 April 2018
- 2017 **Speaker at the workshop 'Orientations and tools for the preparation of Bachelor's Thesis'**, Faculty of Mathematical Sciences, Universidad Complutense de Madrid, Organized by the Miguel de Guzmán chair
13 Decembre 2017
- 2017 **Speaker at the I PhDay Complutense**, Universidad Complutense de Madrid, Scientific outreach contest. Winner
29 November 2017

Services to community

- Editor Guest and Co-guest editor of the journal *Applied Sciences*.
- Referee Referee of the journals *Geometriae Dedicata*, *Revista Matemática Complutense*, *Information Science*, *Scientific Reports*, *Applied Sciences*, *Sensors*...

Courses and Conferences Attended

- 2020 **Complex Lagrangians, Mirror Symmetry and Quantization**, Banff International Research Station
16th-20th October 2023
- 2023 **Quantization in Geometry**, University of Cologne
24th-28th July 2023
- 2020 **Málaga and Topology Meeting**, Universidad de Málaga
5th-7th February 2020
- 2019 **Workshop on Geometric Methods in Symplectic Topology**, Instituto de Ciencias Matemáticas
16th-20th December 2019
- 2019 **GESTA School. Symplectic Geometry with Algebraic Techniques with applications to Mathematical Physics**, Instituto de Ciencias Matemáticas
10th-13th December 2019
- 2019 **Lectures on Geometric Connections and their Holonomy Theory**, Faculty of Mathematical Sciences, Universidad Complutense de Madrid
8 hours

- 2018 **Geometry, Derived Categories and Moduli Spaces**, Centre for Mathematical Sciences, University of Plymouth
12-13 July 2018
- 2018 **Topics on Instantons Probability, Geometry and Physics**, Faculty of Mathematical Sciences, Universidad Complutense de Madrid
20 hours
- 2018 **I BYMAT Conference**, Instituto de Ciencias Matemáticas
7th - 9th May 2018
- 2018 **Geometry for the Future**, Instituto de Ciencias Matemáticas
16th April 2018
- 2018 **III Meeting of the Network of Algebraic Geometry and Singularities (RGAS)**, Faculty of Mathematical Sciences, Universidad Complutense de Madrid
29th January - 2nd February 2018
- 2017 **Modern Moduli Theory Graduate School**, Mathematical Institute (University of Oxford)
18th September - 22th September 2017
- 2017 **Invariant metrics on proper G-spaces**, *Given by Prof. Sergey Antonyan*, Universidad Complutense de Madrid
Doctorate course
- 2016 **Topics in Geometric Analysis: Geometry of the Affine Sphere**, *Given by Prof. Daniel J. F. Fox*, Universidad Complutense de Madrid
Doctorate course
- 2016 **Introduction to Moduli Spaces**, *Given by David Alfaya*, Instituto de Ciencias Matemáticas
30 May - 3 June 2016
- 2016 **Hasse-Schmidt Derivations and Rings of Differential Operators**, *Given by Prof. Luis Narváez*, Universidad Autónoma de Madrid
31 Mayo - 7 Junio de 2016
- 2016 **Topics in Geometric Analysis: Maximum Principles, Gradient Estimates, and Growth of Second Fundamental Forms**, *Given by Prof. Daniel J. F. Fox*, Universidad Complutense de Madrid
Doctorate course
- 2015 **IV Workshop on Topological Groups**, Universidad Complutense de Madrid, Madrid
3-4 December de 2015
- 2015 **Non-linear Partial Differential Equations. Concepts and current methods**, *Given by Prof. Juan Luis Vázquez*, Universidad Autónoma de Madrid
Doctorate course
- 2014 **JAE School of Mathematics 2014**, Instituto de Ciencias Matemáticas
64 hours

- 2014 **IV International School of Geometry and Physics: The Geometry and Physics of Moduli Spaces**, Instituto de Ciencias Matemáticas, Miraflores de la Sierra (Madrid, España)
19-23 May 2014
- 2013 **JAE School of Mathematics 2014**, Instituto de Ciencias Matemáticas
71 hours
- 2012 **JAE School of Mathematics 2014**, Instituto de Ciencias Matemáticas
58 hours
- 2012 **Indo-Spanish Conferences of Geometry and Analysis**, Instituto de Ciencias Matemáticas
10-14 September 2012
- [Courses about mathematics education](#)
- 2018 **Service-learning and gamification**, *Trends in innovative education and its implementation at UPM*, Universidad Politécnica de Madrid
5 hours
- 2018 **Challenge-based learning**, *Trends in innovative education and its implementation at UPM*, Universidad Politécnica de Madrid
5 hours
- 2018 **Methods and models of reseach applied to university learning**, *Coordinated by Prof. Inés M^a Gómez-Chacón*, Universidad Complutense de Madrid
10 hours
- 2017 **Tools for designing, managing and analyzing processes in university teaching**, *Coordinated by Prof. Inés M^a Gómez-Chacón*, Universidad Complutense de Madrid
20 hours

Outreach

Radio Interviews

- 2021 **Podcast de la Unidad de Cultura Científica UCM**, *En las ondas de Marie - Episodio 8*, [Link](#)
8 March 2023
- 2021 **Onda Cero**, *Por Fin no es Lunes*, [Link](#)
7 November 2021
- 2021 **Radio 5**, *Raíz de 5*, [Link](#)
1 November 2021
- 2021 **RNE**, *Interview with Santi García Cremades*
27 October 2021
- 2021 **Radio 3**, *Generación Ya*, [Link](#)
6 October 2021
- 2021 **Podcast BBVA**, *Deep Talks*, [Link](#)
10 October 2021

2021 **SER**, *La Ventana*, Collaboration, [Link](#)
23 August 2021

2021 **SER**, *La Ventana*, [Link](#)
11 August 2021

2021 **COPE**, *La Tarde de COPE*, [Link](#)
10 August 2021

Newspapers

2021 **El Español**, “*El algoritmo que predice si un maltratador va a reincidir: los 3 españoles tras la IA del futuro*”, [Link](#)
11 March 2023

2021 **ABC**, “*Usen las Matemáticas contra el maltrato y reducirán los casos*”, [Link](#)
1 November 2021

2021 **Tribuna Complutense**, *Las matemáticas y la inteligencia artificial se alían contra la violencia machista*, [Link](#)
16 September 2021

2021 **El País**, *Matemáticas e inteligencia artificial contra el maltrato machista*, [Link](#)
2 September 2021

2021 **El País**, *Seis matemáticos españoles menores de 30 años desafían las fronteras de la ciencia*, [Link](#)
3 August 2021

2021 **El Español**, *Ángel, el matemático que hace todo en España: afina Netflix, calcula el Universo y previene el maltrato*, [Link](#)
26 July 2021

Others

2019 **Semana de la Ciencia y la Innovación de la Comunidad de Madrid**, (*Science week of the region of Madrid*), *Ciencia es... ¡la suma de todos!* (*Science is... the sum of everybody!*), Universidad Complutense de Madrid
Co-coordinated with Marina Logares. 9 hours.

2018 **Organizer of I meeting between politicians and scientists: Policies for Science**, Faculty of Mathematical Sciences, Universidad Complutense de Madrid
10 April 2018

Languages

Spanish **Mothertongue.**

English **Advanced**