Miguel González

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Research interests

Complex and algebraic geometry, moduli spaces of geometric structures on Riemann surfaces, Higgs bundles, mirror symmetry, Langlands duality.

Experience

PhD Research - *la Caixa* foundation InPhINIT Retaining Fellowship   2023-
Instituto de Ciencias Matemáticas (ICMAT)   *Project: Higgs bundles, Hausel algebras and involutions*
Advisers: Oscar García-Prada and Tamás Hausel   *Grant LCF/BQ/DR23/12000030*

Research Grant   Sept. 2022 - Jun. 2023
Instituto de Ciencias Matemáticas (ICMAT)   *Project: Cyclic Higgs bundles and Vinberg theory*
Supervised by Oscar García-Prada   *Grant JAEICU-21-ICMAT-01, Top 1 application score*

Research Intern   Jul. 2022 - Aug. 2022
Hausel Group (Geometry and its Interfaces), Institute Of Science And Technology Austria (ISTA)   *Project: Very stable $U(p,q)$-Higgs bundles*
Supervised by Tamás Hausel

Collaboration grant   Nov. 2021 - Jul. 2022
Department of Mathematics, Universidad Autónoma de Madrid   *Project: Theoretical and computational research about*
Supervised by Ernesto Girondo Sirvent   *properties of fundamental domains of Fuchsian groups*

Introduction to Mathematical Research Grant Severo Ochoa   Summer 2021
Instituto de Ciencias Matemáticas (ICMAT)   *Project: Introduction to Moduli Spaces and Higgs Bundles*
Supervised by Oscar García-Prada

Education

PhD Student in Mathematics Research   2023-
Universidad Complutense de Madrid (UCM) - Instituto de Ciencias Matemáticas (ICMAT)
Advisers: Oscar García-Prada and Tamás Hausel

Masters Degree in Mathematics   2022 – 2023
Universidad Autónoma de Madrid (UAM)   *Average grade: 9.94 / 10*
Dissertation: Cyclic Higgs bundles and Vinberg theory   *5 courses with honours*

Double Degree in Mathematics and Computer Science   2017 – 2022
Universidad Autónoma de Madrid (UAM)   *Average grade: 9.82 / 10*
                44 courses with honours

Preprints / Publications

Very stable regular G-Higgs bundles   March 2025
                arXiv:2503.01289

Cyclic Higgs bundles and the Toledo invariant   March 2024
With Oscar García-Prada   *arXiv:2403.00415*

Hitchin map on even very stable upward flows   April 2024
With Tamás Hausel   *International Journal of Mathematics, Vol. 35, No. 9*
                doi:10.1142/S0129167X2441009X

Talks

Wobbly parabolic G-Higgs bundles and affine flag varieties	February 2026
Geometric Structures and Stability Thematic Program	
International Centre for Theoretical Sciences (ICTS-TIFR)	
Very stable G-Higgs bundles and Hecke modifications	November 2025
MIST Conference in Mathematical Physics	
The Chinese University of Hong Kong (CUHK)	
The structure of symmetry: an introduction to root systems	September 2025
ICMAT-UAM Junior Colloquium	
Instituto de Ciencias Matemáticas (ICMAT)	
A criterion for wobbliness of parabolic G-Higgs bundles	August 2025
Seminar talk	
Chern Institute of Mathematics, Nankai University (CIM)	
Compact components in relative character varieties for real lie groups of Hermitian type	August 2025
Geometry Workshop of the Hitchin–Ngô Laboratory	
Feishu (Shanghai)	
$\mathbb{C}^\times$-actions, lagrangian submanifolds and very stable bundles	June 2025
Workshop: Geometry and Topology for the Future III	
Universidad Complutense de Madrid (UCM)	
Very stable regular G-Higgs bundles	June 2025
Hitchin–Ngô Laboratory Special Activity	
Instituto de Ciencias Matemáticas (ICMAT)	
Very stable regular G-Higgs bundles	May 2025
Séminaire d'Analyse et Géométrie	
Institut de Mathématiques de Jussieu–Paris Rive Gauche (IMJ-PRG)	
Very stable regular G-Higgs bundles	May 2025
Conference: Stratifications of Higgs bundle moduli spaces and related topics	
Universidade de Santiago de Compostela (USC)	
Hitchin map on minuscule Lagrangians	February 2025
Bonn–Vienna block seminar: Equivariant cohomology, stable envelopes and big algebras	
University of Bonn	
The decomposition theorem I: finite fields	January 2025
Reading seminar on perverse sheaves	
Universidad Complutense de Madrid (UCM)	
Very stable G-Higgs bundles with regular nilpotent Higgs field	November 2024
RTGF (Spanish Geometry and Physics Thematic Network) meeting	
Instituto de Ciencias Matemáticas (ICMAT)	
The $\mathbb{C}^\times$-action on the moduli space of Higgs bundles	November 2024
"Doc in progress" seminar	
Università degli Studi di Trento (UniTrento)	
The classification of extended 2-TQFTs	May 2024
Reading seminar on ∞-categories	
Universidad Complutense de Madrid (UCM)	
Mixed Hodge theory	April 2024
Arbeitsgemeinschaft: Geometry and Representation Theory around the P=W Conjecture	
Matematisches Forschungsinstitut Oberwolfach (MFO)	
Cyclic Higgs bundles and the Toledo invariant	January 2024
Hausel group seminar	
Institute of Science and Technology Austria (ISTA)	
Introduction to Hodge theory in complex algebraic geometry	January 2024
PhD seminar	
Universidad complutense de Madrid (UCM)	
The Hitchin Fibration and Spectral Curves	February 2023
Hitchin-Ngô Lab Working Group	
Instituto de Ciencias Matemáticas (ICMAT)	

Attended conferences

Geometric Structures and Stability Thematic Program	16-27 February 2026
International Centre for Theoretical Sciences (ICTS-TIFR)	
Hong Kong Laureate Forum 2025	5-8 November 2025
Hong Kong Science Park	
MIST Conference in Mathematical Physics	31 October-4 November 2025
The Chinese University of Hong Kong (CUHK)	
Geometry Workshop of the Hitchin–Ngô Laboratory	7-9 August 2025
Feishu (Shanghai)	
Feishu China Mathematics Symposium	4-6 August 2025
Feishu (Shanghai)	
Higher rank geometric structures, Higgs bundles and physics	19-23 May 2025
Institut Henri Poincaré (IHP)	
Stratifications of Higgs bundle moduli spaces and related topics	5-9 May 2025
Universidade de Santiago de Compostela (USC)	
Geometry at Large, an ICMAT–IMSA collaboration	21-25 April 2025
Instituto de Ciencias Matemáticas (ICMAT)	
RTGF (Spanish Geometry and Physics Thematic Network) meeting	26-29 November 2024
Instituto de Ciencias Matemáticas (ICMAT)	
1st MaPhyAG Workshop: Integrability, Geometry and QFT	7-11 October 2024
Universidad Complutense de Madrid (UCM)	
Clay Research Workshop: The P=W Conjecture in Non Abelian Hodge Theory	30 September-4 October 2024
Mathematical Institute (University of Oxford)	
2nd Simons Math Summer Workshop: Moduli	1-19 July 2024
Simons Center for Geometry and Physics (SCGP)	
Arbeitsgemeinschaft: Geometry and Representation Theory around the P=W Conjecture	1-5 April 2024
Matematisches Forschungsinstitut Oberwolfach (MFO)	
The Hitchin system, Langlands duality and mirror symmetry	24-28 April 2023
Instituto de Ciencias Matemáticas (ICMAT)	
Moduli spaces and geometric structures	12-16 September 2022
Conference in honour of Oscar García-Prada on the occasion of his 60th birthday	
Instituto de Ciencias Matemáticas (ICMAT)	
ICMAT - JAE School of Mathematics	July 2021
Instituto de Ciencias Matemáticas (ICMAT)	

Poster presentations

Very stable G-Higgs bundles	November 2025
Hong Kong Laureate Forum 2025	
Hong Kong Science Park	
Very stable $U(p,q)$-Higgs bundles	August 2022
Summer ISTerns poster session	
Institute of Science and Technology Austria (ISTA)	

Teaching

Linear algebra (Álgebra lineal)	Year 2025-2026, 1st semester
Linear algebra problem sessions for first year undergraduate students in mathematics.	
Universidad Complutense de Madrid (UCM)	
Pequeño Instituto de Matemáticas (PIM) / Little mathematics institute	2023-Ongoing
Advanced mathematics problem-solving classes for high school students. https://www.icmat.es/PIM/	
Instituto de Ciencias Matemáticas (ICMAT)	

Research visits

Institute of Science and Technology Austria (ISTA) *Hausel Group (Geometry and its Interfaces)*	8 March - 10 May 2026
Institut Henri Poincaré, Paris *Higher rank geometric structures research program*	12-23 May 2025
Faculty of Mathematics, University of Duisburg-Essen *Heinloth Group*	7-11 April 2025
Institute of Science and Technology Austria (ISTA) *Hausel Group (Geometry and its Interfaces)*	23 February - 22 March 2025
Institute of Science and Technology Austria (ISTA) *Hausel Group (Geometry and its Interfaces)*	15-26 January 2024
Institute of Science and Technology Austria (ISTA) *Hausel Group (Geometry and its Interfaces)*	19-28 January 2023

Awards and prizes

Master's degree Extraordinary Award (best academic record) *Awarded by Universidad Autónoma de Madrid (UAM)*	2024
UAM Young Talent Award *Awarded by Universidad Autónoma de Madrid (UAM)*	2022
Best undergraduate academic record *Awarded by Universidad Autónoma de Madrid (UAM)*	2022
Excellence Grant *Awarded by the Comunidad de Madrid*	2018, 2019, 2020, 2021
Best academic record of first year undergraduate students *Awarded by Universidad Autónoma de Madrid (UAM)*	2018
Concurso de Primavera de Matemáticas (Mathematics contest) *Winner (Top 20)*	2017
Extraordinary Prize of Bachillerato *Awarded by the Comunidad de Madrid to Top <1% high secondary school students*	2017
Extraordinary Prize of Secondary Education *Awarded by the Comunidad de Madrid to Top <1% basic secondary school students*	2015

Miscellaneous publications

Report for Arbeitsgemeinschaft: Geometry and Representation Theory around the P=W Conjecture
Editor and contributor with the extended abstract for my talk on Mixed Hodge theory.
doi:10.14760/OWR-2024-16
Undergraduate course notes
LaTeX notes for every course I took during my undergraduate mathematics studies.
Available at miguelgg.com

Declined grants (incompatibilities)

PhD studies grant *FPU Grant - Spanish Ministry of Universities* *Funding for a 4 year PhD research and teaching contract*	2023
PhD studies grant *ICMAT Severo Ochoa FPI Grant - Spanish Ministry of Science and Innovation* *Funding for a 4 year PhD research contract*	2023
Masters studies grant *Department of Mathematics, Universidad Autónoma de Madrid (UAM)* *10000€ for masters studies and research*	2022-2023 *Top 1 application score*

Spanish: Native level

English: Fluent level

French: Intermediate level

Japanese: Intermediate level (comprehension), basic level (production)

LaTeX knowledge

Computer skills: Python, C, Java, GitHub, Databases (SQL), Machine Learning and AI (Master rank in kaggle.com), among others.