

# Miguel González

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## Education

PhD Student in Mathematics Research <i>Universidad Complutense de Madrid (UCM) - Instituto de Ciencias Matemáticas (ICMAT)</i> <i>Advisers: Oscar García-Prada and Tamás Hausel</i>	2023-
Masters Degree in Mathematics <i>Universidad Autónoma de Madrid (UAM)</i> <i>Dissertation: Cyclic Higgs bundles and Vinberg theory</i>	2022 – 2023 Average grade: 9.94 / 10 5 courses with honours
Double Degree in Mathematics and Computer Science <i>Universidad Autónoma de Madrid (UAM)</i>	2017 – 2022 Average grade: 9.82 / 10 44 courses with honours

## Experience

PhD Research - <i>la Caixa</i> foundation InPhINIT Retaining Fellowship <i>Instituto de Ciencias Matemáticas (ICMAT)</i> <i>Advisers: Oscar García-Prada and Tamás Hausel</i>	2023-  Project: Higgs bundles, Hausel algebras and involutions Grant LCF/BQ/DR23/12000030
Research Grant <i>Instituto de Ciencias Matemáticas (ICMAT)</i> <i>Supervised by Oscar García-Prada</i>	Sept. 2022 - Jun. 2023  Project: Cyclic Higgs bundles and Vinberg theory Grant JAEICU-21-ICMAT-01, Top 1 application score
Research Intern <i>Hausel Group (Geometry and its Interfaces), Institute Of Science And Technology Austria (ISTA)</i> <i>Supervised by Tamás Hausel</i>	Jul. 2022 - Aug. 2022  Project: Very stable $U(p, q)$ -Higgs bundles
Collaboration grant <i>Department of Mathematics, Universidad Autónoma de Madrid</i> <i>Supervised by Ernesto Gironde Sirvent</i>	Nov. 2021 - Jul. 2022  Project: Theoretical and computational research about properties of fundamental domains of Fuchsian groups
Introduction to Mathematical Research Grant Severo Ochoa <i>Instituto de Ciencias Matemáticas (ICMAT)</i> <i>Supervised by Oscar García-Prada</i>	Summer 2021  Project: Introduction to Moduli Spaces and Higgs Bundles

## Research interests

Differential and algebraic geometry, moduli spaces of geometric structures on Riemann surfaces, Higgs bundles, Mirror Symmetry, Langlands Duality.

## Preprints / Publications

Very stable regular $G$ -Higgs bundles	March 2025 <i>arXiv:2503.01289</i>
Cyclic Higgs bundles and the Toledo invariant <i>With Oscar García-Prada</i>	March 2024 <i>arXiv:2403.00415</i>
Hitchin map on even very stable upward flows <i>With Tamás Hausel</i>	April 2024 <i>International Journal of Mathematics, Vol. 35, No. 9</i> <i>doi:10.1142/S0129167X2441009X</i>

## Attended conferences

Higher rank geometric structures, Higgs bundles and physics <i>Institut Henri Poincaré (IHP)</i>	19-23 May 2025
Stratifications of Higgs bundle moduli spaces and related topics <i>Universidade de Santiago de Compostela (USC)</i>	5-9 May 2025
Geometry at Large, an ICMAT–IMSA collaboration <i>Instituto de Ciencias Matemáticas (ICMAT)</i>	21-25 April 2025
RTGF (Spanish Geometry and Physics Thematic Network) meeting <i>Instituto de Ciencias Matemáticas (ICMAT)</i>	26-29 November 2024
1st MaPhyAG Workshop: Integrability, Geometry and QFT <i>Universidad Complutense de Madrid (UCM)</i>	7-11 October 2024
Clay Research Workshop: The P=W Conjecture in Non Abelian Hodge Theory <i>Mathematical Institute (University of Oxford)</i>	30 September-4 October 2024
2nd Simons Math Summer Workshop: Moduli <i>Simons Center for Geometry and Physics (SCGP)</i>	1-19 July 2024
Arbeitsgemeinschaft: Geometry and Representation Theory around the P=W Conjecture <i>Mathematisches Forschungsinstitut Oberwolfach (MFO)</i>	1-5 April 2024
The Hitchin system, Langlands duality and mirror symmetry <i>Instituto de Ciencias Matemáticas (ICMAT)</i>	24-28 April 2023
Moduli spaces and geometric structures <i>Conference in honour of Oscar García-Prada on the occasion of his 60th birthday</i> <i>Instituto de Ciencias Matemáticas (ICMAT)</i>	12-16 September 2022
ICMAT - JAE School of Mathematics <i>Instituto de Ciencias Matemáticas (ICMAT)</i>	July 2021
Talks	
Very stable regular $G$ -Higgs bundles <i>Séminaire d'Analyse et Géométrie</i> <i>Institut de Mathématiques de Jussieu–Paris Rive Gauche (IMJ-PRG)</i>	May 2025
Very stable regular $G$ -Higgs bundles <i>Conference: Stratifications of Higgs bundle moduli spaces and related topics</i> <i>Universidade de Santiago de Compostela (USC)</i>	May 2025
Hitchin map on minuscule Lagrangians <i>Bonn–Vienna block seminar: Equivariant cohomology, stable envelopes and big algebras</i> <i>University of Bonn</i>	February 2025
The decomposition theorem I: finite fields <i>Reading seminar on perverse sheaves</i> <i>Universidad Complutense de Madrid (UCM)</i>	January 2025
Very stable $G$ -Higgs bundles with regular nilpotent Higgs field <i>RTGF (Spanish Geometry and Physics Thematic Network) meeting</i> <i>Instituto de Ciencias Matemáticas (ICMAT)</i>	November 2024
The $\mathbb{C}^\times$ -action on the moduli space of Higgs bundles <i>“Doc in progress” seminar</i> <i>Università degli Studi di Trento (UniTrento)</i>	November 2024
The classification of extended 2-TQFTs <i>Reading seminar on <math>\infty</math>-categories</i> <i>Universidad Complutense de Madrid (UCM)</i>	May 2024
Mixed Hodge theory <i>Arbeitsgemeinschaft: Geometry and Representation Theory around the P=W Conjecture</i> <i>Mathematisches Forschungsinstitut Oberwolfach (MFO)</i>	April 2024
Cyclic Higgs bundles and the Toledo invariant <i>Hausel group seminar</i> <i>Institute of Science and Technology Austria (ISTA)</i>	January 2024

Introduction to Hodge theory in complex algebraic geometry <i>PhD seminar</i> <i>Universidad complutense de Madrid (UCM)</i>	January 2024
The Hitchin Fibration and Spectral Curves <i>Hitchin-Ngô Lab Working Group</i> <i>Instituto de Ciencias Matemáticas (ICMAT)</i>	February 2023
Teaching	
Pequeño Instituto de Matemáticas (PIM) / Little mathematics institute <i>Advanced mathematics problem-solving classes for high school students. <a href="https://www.icmat.es/PIM/">https://www.icmat.es/PIM/</a></i> <i>Instituto de Ciencias Matemáticas (ICMAT)</i>	2023-2025
Research visits	
Institut Henri Poincaré, Paris <i>Higher rank geometric structures research program</i>	12-23 May 2025
Faculty of Mathematics, University of Duisburg-Essen <i>Heinloth Group</i>	7-11 April 2025
Institute of Science and Technology Austria (ISTA) <i>Hausel Group (Geometry and its Interfaces)</i>	23 February - 22 March January 2025
Institute of Science and Technology Austria (ISTA) <i>Hausel Group (Geometry and its Interfaces)</i>	15-26 January 2024
Institute of Science and Technology Austria (ISTA) <i>Hausel Group (Geometry and its Interfaces)</i>	19-28 January 2023
Awards and prizes	
Master's degree Extraordinary Award (best academic record) <i>Awarded by Universidad Autónoma de Madrid (UAM)</i>	2024
UAM Young Talent Award <i>Awarded by Universidad Autónoma de Madrid (UAM)</i>	2022
Best undergraduate academic record <i>Awarded by Universidad Autónoma de Madrid (UAM)</i>	2022
Excellence Grant <i>Awarded by the Comunidad de Madrid</i>	2018, 2019, 2020, 2021
Best academic record of first year undergraduate students <i>Awarded by Universidad Autónoma de Madrid (UAM)</i>	2018
Concurso de Primavera de Matemáticas (Mathematics contest) <i>Winner (Top 20)</i>	2017
Extraordinary Prize of Bachillerato <i>Awarded by the Comunidad de Madrid to Top &lt;1% high secondary school students</i>	2017
Extraordinary Prize of Secondary Education <i>Awarded by the Comunidad de Madrid to Top &lt;1% basic secondary school students</i>	2015
Skills	
Spanish: Native level English: Fluent level French: Intermediate level Japanese: Intermediate level (comprehension), basic level (production) $\text{\LaTeX}$ knowledge Computer skills: Python, C, Java, GitHub, Databases (SQL), Machine Learning and AI (Master rank in kaggle.com), among others.	

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## Declined grants (incompatibilities)

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PhD studies grant 2023  
*FPU Grant - Spanish Ministry of Universities*  
*Funding for a 4 year PhD research and teaching contract*

PhD studies grant 2023  
*ICMAT Severo Ochoa FPI Grant - Spanish Ministry of Science and Innovation*  
*Funding for a 4 year PhD research contract*

Masters studies grant 2022-2023  
*Department of Mathematics, Universidad Autónoma de Madrid (UAM)* *Top 1 application score*  
*10000€ for masters studies and research*

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## Miscellaneous publications

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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*