

# 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-  <i>Project: Higgs bundles, Hausel algebras and involutions</i> <i>Grant LCF/BQ/DR23/12000030</i>
Research Grant <i>Instituto de Ciencias Matemáticas (ICMAT)</i> <i>Supervised by Oscar García-Prada</i>	Sept. 2022 - Jun. 2023  <i>Project: Cyclic Higgs bundles and Vinberg theory</i> <i>Grant JAEICU-21-ICMAT-01, Top 1 application score</i>
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  <i>Project: Very stable <math>U(p, q)</math>-Higgs bundles</i>
Collaboration grant <i>Department of Mathematics, Universidad Autónoma de Madrid</i> <i>Supervised by Ernesto Girondo Sirvent</i>	Nov. 2021 - Jul. 2022  <i>Project: Theoretical and computational research about properties of fundamental domains of Fuchsian groups</i>
Introduction to Mathematical Research Grant Severo Ochoa <i>Instituto de Ciencias Matemáticas (ICMAT)</i> <i>Supervised by Oscar García-Prada</i>	Summer 2021  <i>Project: Introduction to Moduli Spaces and Higgs Bundles</i>

## 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	
$\mathbb{C}^\times$ -actions, lagrangian submanifolds and very stable bundles <i>Workshop: Geometry and Topology for the Future III</i> <i>Universidad Complutense de Madrid (UCM)</i>	June 2025
Very stable regular $G$ -Higgs bundles <i>Hitchin–Ngô Laboratory Special Activity</i> <i>Instituto de Ciencias Matemáticas (ICMAT)</i>	June 2025
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	April 2024
<i>Arbeitsgemeinschaft: Geometry and Representation Theory around the P=W Conjecture</i>	
<i>Mathematisches Forschungsinstitut Oberwolfach (MFO)</i>	
Cyclic Higgs bundles and the Toledo invariant	January 2024
<i>Hausel group seminar</i>	
<i>Institute of Science and Technology Austria (ISTA)</i>	
Introduction to Hodge theory in complex algebraic geometry	January 2024
<i>PhD seminar</i>	
<i>Universidad Complutense de Madrid (UCM)</i>	
The Hitchin Fibration and Spectral Curves	February 2023
<i>Hitchin-Ngô Lab Working Group</i>	
<i>Instituto de Ciencias Matemáticas (ICMAT)</i>	
Teaching	
Pequeño Instituto de Matemáticas (PIM) / Little mathematics institute	2023-2025
<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>	
Research visits	
Institut Henri Poincaré, Paris	12-23 May 2025
<i>Higher rank geometric structures research program</i>	
Faculty of Mathematics, University of Duisburg-Essen	7-11 April 2025
<i>Heinloth Group</i>	
Institute of Science and Technology Austria (ISTA)	23 February - 22 March January 2025
<i>Hausel Group (Geometry and its Interfaces)</i>	
Institute of Science and Technology Austria (ISTA)	15-26 January 2024
<i>Hausel Group (Geometry and its Interfaces)</i>	
Institute of Science and Technology Austria (ISTA)	19-28 January 2023
<i>Hausel Group (Geometry and its Interfaces)</i>	
Awards and prizes	
Master's degree Extraordinary Award (best academic record)	2024
<i>Awarded by Universidad Autónoma de Madrid (UAM)</i>	
UAM Young Talent Award	2022
<i>Awarded by Universidad Autónoma de Madrid (UAM)</i>	
Best undergraduate academic record	2022
<i>Awarded by Universidad Autónoma de Madrid (UAM)</i>	
Excellence Grant	2018, 2019, 2020, 2021
<i>Awarded by the Comunidad de Madrid</i>	
Best academic record of first year undergraduate students	2018
<i>Awarded by Universidad Autónoma de Madrid (UAM)</i>	
Concurso de Primavera de Matemáticas (Mathematics contest)	2017
<i>Winner (Top 20)</i>	
Extraordinary Prize of Bachillerato	2017
<i>Awarded by the Comunidad de Madrid to Top &lt;1% high secondary school students</i>	
Extraordinary Prize of Secondary Education	2015
<i>Awarded by the Comunidad de Madrid to Top &lt;1% basic secondary school students</i>	
Skills	
Spanish: Native level	
English: Fluent level	
French: Intermediate level	
Japanese: Intermediate level (comprehension), basic level (production)	
TeX 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*