

# Alejandro Gil García

## Curriculum Vitae

February 25, 2025

### About me

**Date and place of birth:** 4 October 1996 in Madrid, Spain

**Address:** Beijing Institute of Mathematical Sciences and Applications (BIMSA)

No. 544, Hefangkou Village, Huaibei Town, Huairou District, Beijing 101408, China

**E-mail:** [alejandrogilgarcia@bimsa.cn](mailto:alejandrogilgarcia@bimsa.cn)

**Webpage:** <https://bimsa.net/people/AlejandroGilGarcia/>

**ORCID:** <https://orcid.org/0000-0002-9370-241X>

### Education

#### **Postdoctoral researcher**

2024 – present

Beijing Institute of Mathematical Sciences and Applications, China

Since August 2024 I have been part of the Analysis and Geometry research group with Sebastian Heller as advisor.

#### **Doctoral visiting position**

2024

Universidad Nacional de Educación a Distancia, Spain

From January 15 to March 31, 2024, I worked with Carlos Shahbazi Alonso on the research project *Supersymmetric evolution flows and their applications to differentiable geometry*. This project, funded by a Leonardo-BBVA grant, is devoted to studying various differential-geometric problems inspired by the mathematical structure of supergravity.

#### **PhD in Mathematics**

2021 – 2024

Universität Hamburg, Germany

I started my PhD on May 1, 2021 under the supervision of Vicente Cortés. I was funded by the Cluster of Excellence Quantum Universe. I defended my thesis on June 26, 2024 and passed the doctorate with the overall grade “with distinction (summa cum laude)”.

#### **Master on Advanced Mathematics**

2019 – 2020

Universidad Complutense de Madrid, Spain

Qualification of 10/10 with honors in the Master’s Thesis and average grade of 9.40/10. The Master’s Thesis supervised by Giovanni Bazzoni and Adela Latorre was an original research work that gave rise to an article.

#### **Generalized Geometry Course**

2019

Universitat Autònoma de Barcelona, Spain

Course taught by Roberto Rubio from July 8 to 19, 2019, in the framework of the Marie Skłodowska-Curie Action GENERALIZED project of the European Union.

## Degree in Mathematics

2014 – 2019

Universidad Autónoma de Madrid, Spain

Qualification of 10/10 in Bachelor's Degree Final Project supervised by Ernesto

Girondo and average grade of 7.39/10.

## Brief research statement

My main research interests within differential geometry are manifolds with special holonomy and special geometric structures. In particular, I am mainly interested in quaternionic Kähler manifolds and geometries related with them and in left-invariant structures on Lie groups. Recently I also started the study of spinors using the formalism of spinorial exterior forms.

## Preprints

1. *Quaternionic Kähler manifolds fibered by solvsolitons* 2025  
(with V. Cortés and M. Röser)  
<https://arxiv.org/abs/2501.12225>
2. *Born Lie algebras* 2024  
(with P. N. Pilatus)  
<https://arxiv.org/abs/2411.04856>
3. *Symmetries of one-loop deformed  $q$ -map spaces* 2024  
(with V. Cortés and D. Thung)  
<https://arxiv.org/abs/2402.16178>

## Publications

1. *Parallel spinors for  $G_2^*$  and isotropic structures* 2025  
(with C. S. Shahbazi)  
Annals of Global Analysis and Geometry  
<https://doi.org/10.1007/s10455-025-09987-y>  
<https://arxiv.org/abs/2409.08553>
2. *Pseudo-Kähler and hypersymplectic structures on semidirect products* 2025  
(with D. Conti)  
Differential Geometry and its Applications  
<https://doi.org/10.1016/j.difgeo.2024.102220>  
<https://arxiv.org/abs/2310.20660>
3. *Moduli spaces of (co)closed  $G_2$ -structures on nilmanifolds* 2024  
(with G. Bazzoni)  
The Quarterly Journal of Mathematics  
<https://doi.org/10.1093/qmath/haae037>  
<https://arxiv.org/abs/2307.04732>
4. *A class of locally inhomogeneous complete quaternionic Kähler manifolds* 2023  
(with V. Cortés and A. Saha)  
Communications in Mathematical Physics  
<https://doi.org/10.1007/s00220-023-04830-6>  
<https://arxiv.org/abs/2210.10097>
5. *Symmetric and skew-symmetric complex structures* 2021  
(with G. Bazzoni and A. Latorre)  
Journal of Geometry and Physics

<https://doi.org/10.1016/j.geomphys.2021.104348>  
<https://arxiv.org/abs/2101.11953>

## Dissertation

Curvature, symmetries and hypersurfaces of supergravity  $c$ -map spaces ([link](#)) 2024

## Talks

*Parallel spinors for  $G_2^*$  and isotropic structures*  
Forschungsseminar über Differentialgeometrie  
Universität Hamburg, Germany (Hamburg) ([link](#)) 2025

*Born Lie algebras*  
Seminario del Grupo de Investigación Geometría y sus aplicaciones  
Universidad Politécnica de Madrid, Spain (Madrid) ([link](#)) 2025

*Curvature, symmetries and hypersurfaces of supergravity  $c$ -map spaces*  
Geometry Seminar  
Yau Mathematical Sciences Center, Tsinghua University, China (Beijing) ([link](#)) 2024

*On the existence of Ricci solitons on hypersurfaces of quaternionic Kähler manifolds*  
Junior Meeting Einstein Geometry and Special Holonomy  
Christian-Albrechts-Universität zu Kiel, Germany (Kiel) ([link](#)) 2024

*On the existence of Ricci solitons on hypersurfaces of  $c$ -map spaces*  
Forschungsseminar über Differentialgeometrie  
Universität Hamburg, Germany (Hamburg) ([link](#)) 2024

*Pseudo-Kähler and hypersymplectic structures on semidirect products*  
Forschungsseminar über Differentialgeometrie  
Universität Hamburg, Germany (Hamburg) ([link](#)) 2024

*Pseudo-Kähler and hypersymplectic structures on semidirect products*  
Seminario de Geometría y Topología  
Universidad de Zaragoza, Spain (Zaragoza) ([link](#)) 2024

*Pseudo-Kähler and hypersymplectic structures on semidirect products*  
Seminario de investigación  
Universidad Politécnica de Madrid, Spain (Madrid) ([link](#)) 2024

*Pseudo-Kähler and hypersymplectic structures on semidirect products*  
Seminario Geometría  
Instituto de Ciencias Matemáticas, Spain (Madrid) ([link](#)) 2024

*Curvature, symmetries and hypersurfaces of supergravity  $c$ -map spaces*  
Mathematical supergravity  
Universidad Nacional de Educación a Distancia, Spain (Madrid) ([link](#)) 2024

*Pseudo-Kähler and hypersymplectic structures on semidirect products*  
Geometry in Como  
Università degli studi dell'Insubria, Italy (Como) ([link](#)) 2023

*Complete cohomogeneity one quaternionic Kähler manifolds*  
ULB Geometry Seminar  
Université libre de Bruxelles, Belgium (Brussels) ([link](#)) 2023

*Complete cohomogeneity one supergravity  $c$ -map spaces*  
Mathematisches Seminar  
Christian-Albrechts-Universität zu Kiel, Germany (Kiel) ([link](#)) 2023

<i>Complete cohomogeneity one supergravity c-map spaces</i> Differential Geometry Seminar Torino Università degli Studi di Torino, Italy (Turin) ( <a href="#">link</a> )	2023
<i>A class of locally inhomogeneous complete quaternionic Kähler manifolds</i> Geometry Seminar Università di Pisa, Italy (Pisa) ( <a href="#">link</a> )	2023
<i>A class of locally inhomogeneous complete quaternionic Kähler manifolds</i> Seminario di Geometria Università degli Studi di Firenze, Italy (Florence) ( <a href="#">link</a> )	2023
<i>Moduli spaces of <math>G_2</math>-structures on nilmanifolds</i> Forschungsseminar über Differentialgeometrie Universität Hamburg, Germany (Hamburg) ( <a href="#">link</a> )	2023
<i>A class of locally inhomogeneous complete quaternionic Kähler manifolds</i> Seminar Topics in Differential Geometry Leibniz Universität Hannover, Germany (Hannover) ( <a href="#">link</a> )	2023
<i>A class of locally inhomogeneous complete quaternionic Kähler manifolds</i> Joint UHH-UCPH Workshop on Geometry Universität Hamburg, Germany (Hamburg) ( <a href="#">link</a> )	2022
<i>A class of locally inhomogeneous complete quaternionic Kähler manifolds</i> Forschungsseminar über Differentialgeometrie Universität Hamburg, Germany (Hamburg) ( <a href="#">link</a> )	2022
<i>A class of locally inhomogeneous complete quaternionic Kähler manifolds</i> Conference “Spaces, Structures, Symmetries” Università degli Studi di Bari Aldo Moro, Italy (Bari) ( <a href="#">link</a> )	2022
<i>Quaternionic Kähler geometry</i> Forschungsseminar über Differentialgeometrie Universität Hamburg, Germany (online) ( <a href="#">link</a> )	2021
<i>Symmetric and skew-symmetric complex structures</i> Forschungsseminar über Differentialgeometrie Universität Hamburg, Germany (online) ( <a href="#">link</a> )	2021

## Workshops

<i>MAM III: Quaternion-Kähler manifolds and the LeBrun-Salamon Conjecture</i> Philipps-Universität Marburg, Germany ( <a href="#">webpage</a> )	2025
<i>International Symposium on Singularities and Applications</i> Tsinghua Sanya International Mathematics Forum, China ( <a href="#">webpage</a> )	2024
<i>Geometric Structures</i> Beijing Institute of Mathematical Sciences and Applications, China ( <a href="#">webpage</a> )	2024
<i>Postdoc Workshop III 2024</i> Yau Mathematical Sciences Center, Tsinghua University, China ( <a href="#">webpage</a> )	2024
<i>Junior Meeting Einstein Geometry and Special Holonomy</i> Christian-Albrechts-Universität zu Kiel, Germany ( <a href="#">webpage</a> )	2024
<i>Northern German Differential Geometry Day (NGDG-Day)</i> Universität Hamburg, Germany ( <a href="#">webpage</a> )	2024
<i>Generalized Geometry Meets String Theory</i> Universidad de Granada, Spain ( <a href="#">webpage</a> )	2024

<i>Mathematical supergravity</i> Universidad Nacional de Educación a Distancia, Spain ( <a href="#">webpage</a> )	2024
<i>Workshop on Curvature and Global Shape</i> Westfälische Wilhelms-Universität Münster, Germany ( <a href="#">webpage</a> )	2023
<i>Northern German Differential Geometry Day (NGDG-Day)</i> Christian-Albrechts-Universität zu Kiel, Germany ( <a href="#">webpage</a> )	2023
<i>The 7th Workshop “Complex Geometry and Lie Groups”</i> Università del Salento, Italy ( <a href="#">webpage</a> )	2023
<i>A Complex Differential Geometry Meeting at UniTo</i> Università degli Studi di Torino, Italy ( <a href="#">webpage</a> )	2023
<i>Joint UHH-UCPH Workshop on Geometry</i> Universität Hamburg, Germany ( <a href="#">webpage</a> )	2022
<i>Construction and degeneration of Einstein 4-manifolds</i> Block seminar in Sulzbürg, Universität Regensburg, Germany ( <a href="#">webpage</a> )	2022
<i>Conference “Spaces, Structures, Symmetries”</i> Università degli Studi di Bari Aldo Moro, Italy ( <a href="#">webpage</a> )	2022
<i>Northern German Differential Geometry Day (NGDG-Day)</i> Leibniz Universität Hannover, Germany ( <a href="#">webpage</a> )	2022
<i>Generalized Geometry in Interaction</i> Instituto de Ciencias Matemáticas, Spain ( <a href="#">webpage</a> )	2022
<i>Workshop on Special Geometries on Riemannian Manifolds</i> Centre de Recherches Mathématiques, Université de Montréal, Canada ( <a href="#">webpage</a> )	2021

## Teaching experience

### Teaching assistant:

<i>Mathematical Communication</i> ( <a href="#">link</a> ) Beijing Institute of Mathematical Sciences and Applications	2024
---	------

## Organized activities

### Workshops:

<i>Geometric Structures</i> Beijing Institute of Mathematical Sciences and Applications	2024
--	------

### Seminars:

<i>Mathematical gauge theory and the standard model of physics</i> Universität Hamburg	2023
<i>Riemann surfaces and Hitchin integrable systems</i> Universität Hamburg	2022

## Community service

Reviewer for zbMATH Open <a href="https://zbmath.org/authors/gil-garcia.alejandro">https://zbmath.org/authors/gil-garcia.alejandro</a>	2023 – present
---	----------------