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SUMMARY

I am a mathematician with a Ph.D. in Differential Geometry from the Complutense University of Madrid (2024), where I worked under the supervision of Professor Marco Castrillón López. My doctoral thesis focused on homogeneous and locally homogeneous spaces, Lie group actions, and invariant connections. My research has advanced the understanding of holonomy and the Ambrose–Singer Theorem, with publications in good journals such as *Transformation Groups*, *Annals of Global Analysis and Geometry*, and *Mediterranean Journal of Mathematics*.

I currently hold a postdoctoral position at the Simion Stoilow Institute of Mathematics of the Romanian Academy (IMAR), funded by the European Union's PNRR program, where I collaborate with Professors Andrei and Sergiu Moroianu on the project *Conformal Aspects of Geometry and Dynamics*. My recent contributions (in 2025) include new results on cohomogeneity one manifolds [CCD25], canonical reductive decompositions of extrinsic homogeneous submanifolds [CC25], and Weyl structures reducible in the direction of the Lee form [Car25].

International collaboration has been a cornerstone of my career. I have developed strong ties with the University of Marburg, working with Professors Ilka Agricola and Eugenia Loiudice during several research stays, including an upcoming postdoctoral stay in 2025. My collaboration with Professor José Carlos Díaz-Ramos at the University of Santiago de Compostela led to the joint publication [CCD25]. In addition, my long-standing partnership with Marco Castrillón López through projects at the Complutense University of Madrid allows me to maintain solid academic links with Spain. Altogether, these experiences reflect my commitment to mobility, knowledge exchange, and the building of long-term international research networks.

My career also includes a natural interruption between 2022 and 2024, during which I combined full-time teaching responsibilities at a high school with shorter research activities. This experience strengthened my resilience and discipline, while also enhancing my leadership and communication skills through the daily management of demanding classroom settings. At the same time, I remained engaged with the mathematical community through seminars and collaborations, ensuring academic continuity.

My future research aims to deepen the interaction between symmetry, geometry, and dynamics, with particular emphasis on conformal and Weyl structures. Inspired by the work of Andrei Moroianu on compact Riemannian manifolds with reducible Weyl structures, my recent preprint [Car25] extends this perspective, in a special case, to the setting of complete, non-compact Riemannian manifolds. In parallel, my knowledge in homogeneous manifolds enabled me to provide a positive solution to a conjecture proposed by Antonio Lotta (2023), proving that every homogeneous Kenmotsu manifold is isometric to real hyperbolic space.

Since joining IMAR on September 15th, 2024, and resuming full-time research, I have returned with renewed energy, which has rapidly translated into several publications, preprints, international presentations, and ongoing collaborations. I have attended four international conferences, delivered more than six talks, completed two short research stays, posted two preprints on arXiv, and published one article. I can confidently state that this period has been highly productive. Building on this momentum, and supported by my strong background in international collaborations, teaching, and dissemination, I am highly motivated to contribute to the European Research Area by advancing knowledge in differential geometry and by mentoring the next generation of mathematicians.

WORK EXPERIENCE

From: 16/09/2024 To: Current	**Postdoctoral Researcher in the Simion Stoilow Institute of mathematics of the Romanian academy (IMAR).** This Postdoctoral position is supported by the PNRR-III-C9-2023-I8 grant CF 149/31.07.2023 Conformal Aspects of Geometry and Dynamics in Bucharest.	IMAR
From: 01/09/2022 To: 10/09/2024	**Teacher in a High School.** Permanent position.	
From: 01/10/2020 To: 31/08/2022	**Predoctoral Researcher in differential geometry University Complutense of Madrid (UCM).** FPI predoctoral fellow at the group of research Geometrical, topological and combinatorial structures associated with dynamical systems. Principal researcher: Marco Castrillón López.	UCM
From: 01/07/2020 To: 30/09/2020	**Researcher in differential geometry Instituto de Ciencias Matemáticas (ICMAT).** Researcher grant at ICMAT (CSIC) associated with the research group ALGEBRA AND GEOMETRY.	ICMAT

EDUCATION

10/05/2024	**Ph.D. in Mathematics** P.h.D. Thesis entitled "Homogeneous descriptions and families of homogeneous structures". Department of Algebra, Geometry and Topology in University Complutense of Madrid. Advisor: Marco Castrillón López.	University Complutense of Madrid
2019	**Master's in mathematics teaching** at University of Granada.	University of Granada
2018	**Master of Science in advanced mathematics.** GPA: 9.58/10. Dissertation: "The Ambrose-Singer Theorem". Tutor: Marco Castrillón López.	University Complutense of Madrid
2017	**Degree in Mathematics** GPA: 9.17/10.	University of Málaga

PUBLICATIONS

ACCEPTED:

[CCD25] Carmona Jiménez, J.L., Castrillón López, M., Díaz Ramos, J.C. *The Ambrose–Singer Theorem for cohomogeneity one Riemannian manifolds*. Transformation Groups (2025). DOI: 10.1007/s00031-025-09927-x

[CC22] Carmona Jiménez, J.L., Castrillón López, M. *The Ambrose–Singer Theorem for General Homogeneous Manifolds with Applications to Symplectic Geometry*. Mediterr. J. Math. 19, 280 (2022). DOI: 10.1007/s00009-022-02197-x

[CC22*] Carmona Jiménez, J.L., Castrillón López, M. *The homogeneous holonomies of complex hyperbolic space*. Ann. Glob. Anal. Geom. 62, 391–411 (2022). DOI: 10.1007/s10455-022-09852-2

[CC20] Carmona Jiménez, J.L., Castrillón López, M. *Reduction of Homogeneous Pseudo-Kähler Structures by One-Dimensional Fibers*. Axioms. 9(3):94 (2020). DOI: 10.3390/axioms9030094

PREPRINT:

[Car25] Carmona Jiménez, J.L. *On Weyl structures reducible in the direction of the Lee form*. arXiv (2025). DOI: 10.48550/arXiv.2507.17496

[CC25] Carmona Jiménez, J.L., Castrillón López, M. *Canonical reductive decomposition of extrinsic homogeneous submanifolds*. arXiv (2025). DOI: 10.48550/arXiv.2506.05580

TEACHING EXPERIENCE

AT UNIVERSITY:

2023-2024	**Riemannian Geometry** I taught 6 hours of exercise sessions in Riemannian Geometry at the	University of Bucharest

	University of Bucharest for students of the Master of Science in mathematics.	
2020 - 2022	**Linear algebra, 1st year** I taught 105 hours of exercise sessions in Linear algebra at Faculty of Mathematics and Faculty of Informatics in University Complutense of Madrid for two years.	University Complutense of Madrid
2020	**Seminar Course.** A seminar course of 10 hours entitled “The Ambrose-Singer Theorem”. The Seminar course occurs during my stay at Faculty of Mathematics in Santiago de Compostela.	University of Santiago de Compostela

AT HIGH SCHOOL:

2022 - 2024	**Full teacher at High School for two years.** I was teaching to students in I.E.S. Las Lagunas in Mijas, Spain and I.E.S. Mar de Alborán in Estepona, Spain.	

LONG RESEARCH STAY

From: 15/09/2025 To: 30/11/2025	**University of Marburg // Philipps-Universität Marburg** Forthcoming Postdoctoral Research stay with Dr. Eugenia Loiudice at the Faculty of Mathematics and Informatics.	Germany
From: 01/05/2022 To: 31/07/2022	**University of Marburg // Philipps-Universität Marburg** Predoctoral research stay with Prof. Dr. habil. Ilka Agricola at the Faculty of Mathematics and Informatics.	Germany
From: 20/09/2021 To: 20/12/2021	**University of Santiago de Compostela.** Predoctoral research stay with Profesor Catedrático José Carlos Díaz Ramos at the department of Geometry and Topology.	Spain

SHORT RESEARCH STAYS

From: 23/06/2022 To: 27/06/2022	**University of Marburg // Philipps-Universität Marburg.** Research stay with Dr. Eugenia Loiudice at the Faculty of Mathematics and Informatics.	Germany
From: 17/10/2024 To: 28/10/2024	**University of Málaga.** Short research stay with Profesor Marián Cañadas at the department of Geometry and Topology. I gave a talk entitled: "On the history of Ambrose-Singer Theorems."	Spain

PROJECTS

From: 01/09/2025 To: 31/08/2027	**Geometric structures on manifolds, symmetry and field theory** My contribution: Participant. Principal researcher: Marco Castrillón López. Funding entity: Ministry of Science and Innovation. Start-end date: 01/09/2025 - 31/08/2027. Funding amount: 91.250,00 €	PID2024-156578NB-I00
From: 01/01/2024 To: 30/06/2026	**Conformal Aspects of Geometry and Dynamics.** My contribution: Participant. Principal researcher: Andrei Moroianu. Funding entity: *NextGenerationEU*, through the *Planul Național de Redresare și Reziliență*, Romania. Start-end date: 01/01/2024 - 31/06/2026. Funding amount: 6,000,000 RON ~ 1,200,000 €.	PNRR-III-C9-2023-I8 grant CF 149/31.07.2023
From: 01/09/2024 To: 31/08/2026	**Geometrical, topological and combinatorial structures associated with dynamical systems.** My contribution: Participant. Principal researcher: Marco Castrillón López and Luis Giraldo. Funding entity: Ministry of Science and Innovation. Start-end date: 01/09/2022 - 31/08/2025. Funding amount: 108,900.00 €.	PID2021-126124NB-100

From: 01/01/2019 To: 31/12/2021	**Combinatorics and dynamics: geometric and topological aspects in manifolds.** Contribution: Participant. PIs: Marco Castrillón López and Luis Giraldo. Funding entity: Ministry of Science and Innovation. Start-end date: 01/01/2019 - 31/12/2021. Funding amount: 68,002.00 €.	PGC2018-098321-B-100
2020	**Algebra and geometry: Differential Geometry, Symplectic Geometry and Geometric Mechanics.** I was a participant during my research contract at ICMAT.	20205-CEX001

FELLOWSHIPS

From: 01/01/2024 To: 30/08/2026	**FPI predoctoral fellowship at University Complutense of Madrid.** Funding entity: Ministry of Science and Innovation, Spain. Start-end date: 01/10/2020 - 31/08/2022. Department: Álgebra, Geometry and Topology. Group of research: Geometrical, topological and combinatorial structures associated with dynamical systems. Principal researcher: Marco Castrillón López.	FPI
From: 6/11/2017 To: 6/07/2018	**Research fellowship to collaborate with a department during the Master of Science in advanced mathematics at University Complutense of Madrid.** Funding entity: Ministry of Science and Innovation, Spain. Start-end date: 06/11/2017 - 06/07/2018. Department: Department of Álgebra, Geometry and Topology at University Complutense of Madrid. Advisor: Marco Castrillón López.	

CONFERENCE PARTICIPATION

01/07/2025 Attendee.	**Conformal Geometry and More – A conference in honor of Liviu Ornea.** Facultatea de Matematică si Informatică, Bucharest, Romania. July 2025. Participation: Attendee.
01/02/2025 Attendee.	**MAM III: Quaternion-Kähler manifolds and the Lebrun-Salamon Conjecture.** Philipps-Universität Marburg, Marburg, Germany. Participation: Attendee.
01/01/2025 Speaker.	**RSME's 7th Congress of Young Researchers.** Real Sociedad Matemática Española, Bilbao, Spain. Participation: Speaker with talk entitled *Symplectic invariant connections*.
01/10/2024 Speaker.	**The 2nd International Conference on Differential Geometry-ICDG-Fez 2024. Fez, Morocco.** Participation: Speaker with talk entitled *Cohomogeneity one invariant connections.*
01/08/2022 Speaker.	**Conference Differential Geometry and its Applications.** University of Hradec Králové. Participation: Speaker with talk entitled *The Ambrose-Singer Theorem for symplectic geometry*.
15/10/2021 Speaker.	**Symmetry and Shape II.** University of Santiago de Compostela. Participation: Speaker with talk entitled *On reductive locally homogeneous Fedosov manifolds*.
01/08/2021 Speaker.	**Online Summer School on Geometry and Topology.** University of Hradec Králové. Participation: Speaker with talk entitled *Fedosov Homogeneous Structures*.
01/12/2020 Speaker.	**Third BYMAT conference: Bringing Young Mathematicians Together.** Instituto de ciencias matemáticas (ICMAT). Participation: Speaker with talk entitled *The Ambrose- Singer Theorem for general homogeneous manifolds with applications to symplectic geometry*.
31/10/2019 Poster.	**Symmetry and Shape I.** University of Santiago de Compostela. Participation: Poster entitled *Characterization of simply-connected homogeneous spaces with geometric structures*.
01/09/2019 Poster.	**Conference Differential Geometry and its Applications.** University of Hradec Králové.

	Participation: Poster entitled *A generalization of Ambrose-Singer Theorem*.
08/07/2019 Speaker.	**13th ICMAT International Summer School on Geometry, Mechanics and Control.** Instituto de ciencias matemáticas (ICMAT), Madrid. Participation: Speaker with talk entitled *Locally homogeneous Riemannian spaces*.
24/05/2019 Attendee.	**Second BYMAT conference: Bringing Young Mathematicians Together.** Instituto de ciencias matemáticas (ICMAT), Madrid. Participation: Attendee.
01/07/2018 Attendee.	**12th ICMAT International Summer Shool on Geometry, Mechanics and Control.** University of Santiago de Compostela, Santiago. Participation: Attendee.

SEMINAR AND SHORT TALKS

24/06/2025	**Geometry Seminar at Philipps-Universität Marburg** Talk in English at Philipps-Universität Marburg Title: *The Ambrose-Singer Theorem for Cohomogeneity one Riemannian manifolds.*
11/04/2025	**Geometry Seminar IMAR** Talk in English at IMAR Title: *The Ambrose-Singer Theorem for cohomogeneity one manifolds*
21/10/2024	**Lecture at the University of Málaga** Talk in Spanish at UMA Title: *On the history of Ambrose-Singer Theorems*
15/10/2024	**Geometry Seminar IMAR** Talk in English at IMAR Title: *Ambrose-Singer theorems III*
08/10/2024	**Geometry Seminar IMAR** Talk in English at IMAR Title: *Ambrose-Singer theorems II*
01/10/2024	**Geometry Seminar IMAR** Talk in English at IMAR Title: *Ambrose-Singer theorems*
03/07/2023	**Divulgation talk at VII Ph.D.ay Mathematics.** Talk in Spanish at University Complutense of Madrid. Title: *Teselaciones y espacios homogéneos*. Title in English: *Tessellations and homogeneous spaces*.
12/04/2023	**Round table about professional outings in Mathematics.** Participant of the round table talking about my personal experience. Title: *Mesa Redonda de la IV Jornada sobre Salidas Profesionales de las Matemáticas*. Title in English: *Round Table of the IV Conference on Career Opportunities in Mathematics*.
04/04/2022	**Interesting seminar of Geometry and Topology (UMA).** Talk in English for the department of Geometry and Topology at University of Málaga. Title: *The Ambrose-Singer Theorem*.
24/06/2021	**Divulgation talk at V Ph.D.ay Mathematics.** Talk in Spanish at University Complutense of Madrid. Title: *Las geometrías homogéneas del espacio hiperbólico complejo*. Title in English: *The Homogeneous Geometries of Complex Hyperbolic Space*.
17/11/2021	**Divulgation Seminar at University of Santiago de Compostela.** Talk in Spanish. Title: Teselaciones y Espacios homogéneos. Title in English: Tessellations and homogeneous spaces.
02/07/2019	**Divulgation talk at III Ph.D.ay Mathematics.** Talk in Spanish at University Complutense of Madrid. Title: *El teorema de Ambrose-Singer. Un puente entre el Álgebra, la Geometría y el Análisis.* Title in English: *The Ambrose-Singer Theorem: A Bridge between Algebra, Geometry, and Analysis*.

LANGUAGES

English - Advanced. Spanish - native