

CURRICULUM VITAE ABREVIADO (CVA)

IMPORTANT – The Curriculum Vitae cannot exceed 4 pages. Instructions to fill this document are available in the website.

Part A. PERSONAL INFORMATION

First name	Alfonso		
Family name	Romero Sarabia		
		URL Web	
Open Researcher and Contributor ID (ORCID)		0000-0002-9839-847X	

A.1. Current position

Position	Full Professor		
Initial date	22/12/2000		
Institution	University of Granada		
Department	Geometry and Topology	Faculty of Sciences	
Country	Spain		
Key words	Mean curvature vector field of spacelike submanifolds in relativistic spacetimes; Eigenvalues of compact spacelike submanifolds; Existence and uniqueness of spacelike graphs with constant mean curvature; Kinematics in General Relativity		

A.2. Previous positions (research activity interruptions, indicate total months)

Period	Position/Institution/Country
1979-1986	Assistant Professor/University of Granada/Spain
1986-2000	Associated Professor/University of Granada/Spain

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
Graduate in Mathematics	University of Granada/Spain	1979
PhD Mathematics	University of Granada/Spain	1982

Part B. CV SUMMARY TC: Total Citations, Source: Scopus, Author ID: [25653137600](#)

My research career began in 1979, therefore, it covers a significant number of years. New fields of research have been introduced, as, for instance, the articles *Math. Ann.* **261** (1982), 55-62, <https://doi.org/10.1007/BF01456410> and *Gen. Relativ. Gravit.* **27** (1995) 71-84, <https://doi.org/10.1007/BF02105675>, where indefinite Kähler Geometry models of constant holomorphic sectional curvature were established, and complete mean curvature (CMC) spacelike hypersurfaces in GRW spacetimes were firstly classified, resp. These articles have received TC: 125 and TC: 287, resp. In the articles *J. Differential Equations*, **264** (2018), 7242-7269, <https://doi.org/10.1016/j.jde.2018.02.014> and *P. Roy. Soc. Edinb. A. Math.*, **143** (2013), 881-892, <https://doi.org/10.1017/S0308210511001119> bifurcation of solutions of the mean curvature spacelike equation in FLRW spacetimes has been investigated for the first time, and compact spacelike surfaces in a light cone of four-dimensional Lorentz-Minkowski space are studied, TC: 12 and TC: 18, resp. New techniques and tools have been introduced, for instance in *Pacific. J. Math.* **186** (1998), 141-148, TC: 18, <https://doi.org/10.2140/pjm.1998.186.141>, *Trans. Amer. Math. Soc.* **354** (2002), 4505-4523, TC: 20, <https://doi.org/10.1090/S0002-9947-02-03060-X> and *Class. Quantum Grav.* **30** (2013), 115007(1-13) TC: 67, <https://doi.org/10.1088/0264-9381/30/11/115007>, where Bochner's technique on compact Lorentzian manifolds was introduced, new integral formulas were constructed in order to study conjugate points along lightlike geodesics on a compact Lorentzian manifold, and where it was introduced the family of spatially parabolic GRW

spacetimes and a new way to study their complete maximal hypersurfaces was carried out, resp. My research could be described in part as multidisciplinary, indeed, four of my seven PhD thesis students were physics graduates. Moreover, it has received a wide international attention. Besides Differential Geometry, my research was also involved of another branch of mathematics as shows the article *Anal. Appl.* **11** (2013), 1350002(13 pp), TC:10, <https://doi.org/10.1142/S0219530513500024>. Furthermore, it shown some applications to Mechanics and Mathematical Relativity, as shown in *J. Math. Phys.* **48** (2007), 082904(1-27) <https://doi.org/10.1063/1.2767535> (TC: 128), and *Europhysics Letters* **77** (2007), 34002(1-5) (TC: 53), <https://doi.org/10.1209/0295-5075/77/34002>, where the equation of magnetic trajectories on Riemannian manifolds was studied as well as the relation with solutions of other differential equations describing relativistic motions. *Arch. Rational Mech. Anal.* **208** (2013), 255-274 (TC: 15), <https://doi.org/10.1007/s00205-012-0596-2> where completeness of the inextensible trajectories of certain general second order differential equation on a complete Riemannian manifold was studied, and *Gen. Relativ. Gravit.* **47** (2015), 33(1-13) (TC: 22, and 2593 reads in *Researchgate*), <https://doi.org/10.1007/s10714-015-1879-3>, where the uniformly accelerated motion in general relativistic spacetimes was systematically introduced and studied. According Scopus: h-index 23. Moreover, A. Romero is one of the seven mathematicians from University of Granada included in the Ranking of the World Scientists: World's Top 2% Scientists 2024, Stanford University, U.S.A. Finally, my scientific interest now revolves around: (1) CMC complete spacelike hypersurfaces in spacetimes with some causal symmetry, especially Calabi-Bernstein type existence and uniqueness problems for entire solutions of the PDE defined by a spacelike graph with constant mean curvature. (2) Complete spacelike submanifolds with causal mean curvature vector field in a spacetime with some causal symmetry, in particular, trapped surfaces and more general codimension two compact spacelike submanifolds in spacetimes. (3) Relevant particle motions in spacetime, especially particle motions under an electromagnetic field, completeness of the inextensible trajectories under physically reasonable assumptions. (4) Eigenvalues of the Laplacian of a compact spacelike submanifold in Lorentz-Minkowski spacetime.

Part C. RELEVANT MERITS

C.1. Publications TC: Total Citations, APY (Average Per Year), Source: Scopus.

- F.J. Palomo and A. Romero, Exploring new extrinsic upper bounds on the first eigenvalue of the Laplace operator for compact submanifolds in Euclidean spaces, *J. Differ. Equ.* **425** (2025), 789-804. <https://doi.org/10.1016/j.jde.2025.01.076> TC: 0, APY: 0.
- D. Ferreira, E.A. Lima, F.J. Palomo and A. Romero, A new approach to the study of spacelike submanifolds in a spherical Friedmann-Lemaître-Robertson-Walker spacetime: characterization of the stationary spacelike submanifolds as an application, *J. Phys. A: Math. and Theor.*, **56** (2023), 245202 (15 pp.) <https://doi.org/10.1088/1751-8121/acd502> TC: 0, APY: 0.
- F.J. Palomo, J.A.S. Pelegrín, and A. Romero, Rigidity results for complete spacelike submanifolds in plane fronted waves, *RACSAM*, **116** (2022), 179 (10 pp.). <https://doi.org/10.1007/s13398-022-01315-4> TC: 2, APY: 1.
- F.J. Palomo and A. Romero, On the first eigenvalue of the Laplace operator for compact spacelike submanifolds in Lorentz–Minkowski spacetime, *Proc. R. Soc. Edinb. A*, **152** (2022), 311-330. <https://doi.org/10.1017/prm.2021.5> TC: 0, APY: 0.
- F.J. Palomo, A. Romero and V.L. Cánovas, Mean curvature of spacelike submanifolds in a Brinkmann spacetime, *Class. Quantum Gravity*, **38** (2021), 195013 (18 pp.). <https://doi.org/10.1088/1361-6382/abff9d> TC: 2, APY: 0.

- D.A. Ferreira, E. Lima Jr. and A. Romero, Complete stationary spacelike surfaces in an n -dimensional Generalized Robertson–Walker spacetime, *Mediterr. J. Math.* **19** (2022), 213 (14 pp.) <https://doi.org/10.1007/s00009-022-02145-9> TC: 1, APY: 0.25.
- A. Romero, R.M. Rubio and J.J. Salamanca, New examples of Moser-Bernstein type problems for some nonlinear elliptic partial differential equations, *Annales Fennici Mathematici*, **46** (2020), 781-794. <https://doi.org/10.5186/aasfm.2021.4651> TC: 2, APY: 0.5.
- G. Dai, A. Romero and P.J. Torres, Global bifurcation of solutions of the mean curvature spacelike equation in certain standard static spacetimes, *Discrete Contin. Dyn. Syst. Ser. S*, **13** (2020), 3047–3071. <https://doi.org/10.3934/dcdss.2020118> TC: 3, APY: 0.75.
- J.A.S. Pelegrín, A. Romero and R.M. Rubio, Spacelike hypersurfaces in spatially parabolic standard static spacetimes and Calabi-Bernstein type problems, *Mediterr. J. Math.*, **16** (2019), article number 34, (15 pp.) <https://doi.org/10.1007/s00009-019-1322-1> TC: 6, APY: 1.2.
- G. Dai, A. Romero and P. Torres, Global bifurcation of solutions of the mean curvature spacelike equation in certain Friedmann-Lemaître - Robertson-Walker spacetimes, *J. Differential Equations*, **264** (2018), 7242-7269. <https://doi.org/10.1016/j.jde.2018.02.014> TC: 12, APY: 2.
- O. Palmas, F.J. Palomo and A. Romero, On the total mean curvature of a compact spacelike submanifold in Lorentz-Minkowski spacetime, *P. Roy. Soc. Edinb. A. Mat.*, **148** (2018), 199-210. <https://doi.org/10.1017/S0308210517000063> TC: 2, APY: 0.33.
- C. Bereanu, D. de la Fuente, A. Romero and P. Torres, Existence and multiplicity of entire radial spacelike graphs with prescribed mean curvature function in certain Friedmann-Lemaître-Robertson-Walker spacetimes, *Commun. Contemp. Math.*, **19** (2017), 1650006(18 pp.) <https://doi.org/10.1142/S0219199716500061> TC: 12, APY: 1.7.
- D. de la Fuente, A. Romero and P. J. Torres, Existence and extendibility of rotationally symmetric graphs with a prescribed higher mean curvature function in Euclidean and Minkowski spaces, *J. Math. Anal. Appl.*, **446** (2017), 1046-1059. <https://doi.org/10.1016/j.jmaa.2016.09.022> TC: 7, APY: 1.
- E.A. Lima and A. Romero, Uniqueness of complete maximal surfaces in certain Lorentzian spacetimes, *J. Math. Anal. Appl.*, **435** (2016), 1352-1363. <https://doi.org/10.1016/j.jmaa.2015.10.071> TC: 4, APY: 0.5.
- J.A.S. Pelegrín, A. Romero and R.M. Rubio, On maximal hypersurfaces in Lorentz manifolds admitting a parallel lightlike vector field, *Class. Quantum Grav.*, **33** (2016), 055003(1-8). <https://doi.org/10.1088/0264-9381/33/5/055003> TC: 14, APY: 1.6.
- D. de la Fuente, A. Romero and P. Torres, Entire spherically symmetric spacelike graphs with prescribed mean curvature function in Schwarzschild and Reissner-Nordström spacetimes, *Class. Quantum Grav.*, **32** (2015), 035018(1-17). <https://doi.org/10.1088/0264-9381/32/3/035018> TC: 8, APY: 0.88.
- D. de la Fuente and A. Romero, Uniformly accelerated motion in General Relativity: completeness of inextensible trajectories, *Gen. Relativ. Gravit.* **47** (2015), 33 (13 pp.) <https://doi.org/10.1007/s10714-015-1879-3> TC: 22, APY: 2.44.

C.2. Congress

- International Symposium Square Bamboo and the Geometree 2024, December 4-5, 2024 (on-line). *Exploring the Willmore-Chen inequality for n -dimensional compact spacelike submanifolds in $(n + 2)$ -dimensional Lorentz-Minkowski spacetime*. Invited Speaker.
- Riemannian Geometry and Applications, RIGA 2023 (on-line), Bucharest, Romania, September 22-24, 2023. *The first eigenvalue of the Laplacian for a compact spacelike submanifold in Lorentz-Minkowski spacetime of arbitrary dimension*. Invited Speaker.
- 20th International Workshop on Hermitian Symmetric Spaces and Submanifolds and the 12th RIRCM-OCAMI Joint Differential Geometry Workshop, Kyungpook National University, Daegu, Republic of Korea, July 26-30, 2016. *Constant Mean Curvature Spacelike Hypersurfaces in Spacetimes with Certain Causal Symmetries*. Plenary Speaker.
- ICM 2014 Satellite Conference and the 18th International Workshop on Real and Complex Submanifolds, National Institute for Mathematical Sciences, Daejeon, Republic of Korea, August 10-12, 2014. *A New Technique for the Study of Complete Maximal Hypersurfaces in Certain Open Generalized Robertson-Walker Spacetimes*. Plenary Speaker.
- VII Workshop on Geometric Analysis, Universidade Federal do Ceará, Fortaleza, Brazil, February 17-21, 2014. *Complete maximal hypersurfaces in spatially parabolic Generalized Robertson-Walker spacetimes*. Speaker.
- Spanish-Japanese Workshop on Differential Geometry Granada, Spain, February 14-18, 2011. *Constant Mean Curvature spacelike surfaces and Calabi-Bernstein's type problems in 3-dimensional GRW spacetimes*. Invited Speaker.

C.3. Research projects

- “Geometría semi-riemanniana y flujos geométricos en Física-Matemática”, PID2020-116126GB-I00, Ministerio de Ciencia e Innovación, from October 1st 2021 to September 30th 2025. Researcher. <http://gigda.ugr.es/pm2021/index.html>
- “Análisis Global en Variedades de Riemann y de Lorentz con Aplicaciones en Relatividad General”, A-FQM-494-UGR18, Programa operativo FEDER 2014-2020 y Consejería de Transformación Económica, Industria, Conocimiento y Universidades de la Junta de Andalucía, from January 1st 2020 to June 30th 2022. Principal Investigator <https://gigda.ugr.es/avryl/>
- “Ecuaciones Diferenciales en Variedades, Física Matemática y Aplicaciones”, PY20_01391, Programa operativo FEDER 2014-2020 y Consejería de Transformación Económica, Industria, Conocimiento y Universidades de la Junta de Andalucía, from 30 June 2020 to December 31st 2022. Researcher. <https://gigda.ugr.es/dem-mpa/>
- “Geometría semi-Riemanniana y problemas variacionales en Física Matemática” MTM2016-78807-C2-1-P. Ministerio Economía y Competividad, from 2017 to 2020. Researcher.
- “Geometría semi-Riemanniana y problemas variacionales en Física Matemática” MTM2013-47828-C2-1-P. Ministerio Economía y Competividad, from 2015 to 2018. Researcher.