

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	Amalia		
Family name	Williart Torres		
Open Researcher and Contributor ID (ORCID) (*)	0000-0001-9963-9602		

(*) Mandatory

A.1. Current position

Position	Profesora Titular de Universidad		
Initial date	21/04/2003		
Institution	Universidad Nacional de Educación a Distancia		
Department/Center	Física Interdisciplinar	Facultad de Ciencias	
Country	Spain	Teleph. number	913987184
Key words	Radiaciones ionizantes. Interacción de la radiación con materiales de interés radiológico y medioambiental		

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

Period	Position/Institution/Country/Interruption cause
1/05/1990-1/05/1991	Profesora asociada a tiempo parcial/F. de Ciencias/UNED
1/05/1991-1/10/1999	Profesora asociada a tiempo completo/F.de Ciencias/UNED
1/10/1999-2/07/2001	PTEU interina//F. de Ciencias/UNED
1/07/2001-21/04/2003	PTEU /F .de Ciencias/UNED

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
Licenciada en Ciencias Físicas	Universidad Complutense de Madrid	1988
Doctora en Ciencias Físicas	Universidad Complutense de Madrid	1996

(Include all the necessary rows)

Part B. CV SUMMARY

Valoración positiva de dos sexenios de investigación, el último concedido en resolución del 5 de junio de 2019.

Número total de citas: 1149

Promedio de citas: 9,3 citas/año

Publicaciones totales en Q1: 7

Índice h = 8

Participación en los sucesivos proyectos de investigación liderados por el IP Gustavo García Gómez-Tejedor del CSIC, en los que se ha estudiado la interacción de la radiación (electrones secundarios, rayos X, rayos gamma) con sistemas de interés biomédico y su relación con el daño por radiación (véase C2). Esta colaboración se ha llevado a cabo tanto en los locales del CSIC como en los de la UNED. Fruto de esta colaboración han sido varias publicaciones y la presentación de diversos resultados en congresos, tanto nacionales como internacionales.



En el laboratorio de interacción radiación-materia (Unidad Asociada al CSIC durante 11 años) sito en la Facultad de Ciencias de la UNED, cuya investigadora responsable es A. Williard, se ha puesto a punto un sistema experimental de rayos X para el estudio de las interacciones de electrones secundarios. Montaje de diversos sistemas espectroscópicos para realizar medidas de distintos emisores de radiación (I-125, Ru-106, entre otros) y de la interacción de las distintas emisiones (electrones, positrones, gamma) con varios materiales.

También ha realizado labores de gestión de la investigación, en el Comité de Organización de tres congresos celebrados en Madrid.

Además durante 9 años (2005-2014) ha realizado actividades de gestión de la investigación como Vicedecana de Investigación de la Facultad de Ciencias de la UNED.

En la actualidad es Directora del Departamento de Física Interdisciplinar (antes de los Materiales) de la UNED (desde noviembre 2015).

Ha participado en numerosas actividades de divulgación científica sobre temas relacionados con el uso de las Radiaciones Ionizantes, Energía e Impacto ambiental de la energía en colaboración con la Real Sociedad Española de Física, entre otros.

Part C. RELEVANT MERITS (sorted by typology)

C.1. Publications

- Autores (p.o. de firma): A. Williard, A. Muñoz, D. Boscolo, E. Scifoni M. Krämer, G. García
Título: ***Study on Tl-204 simultaneous electron and photon spectra and their interaction with gold absorbers. Experimental results and Monte Carlo simulations.***
Ref. Nucl. Inst. Meth. Phys. Res. A
Volumen: 927 pags. 435-442. Fecha: Marzo 2019
- Autores (p.o. de firma): R. Colmenares, A. Williard, A. Muñoz, F. Blanco, G. García and K. Krupa
Título: ***A process to describe radiation damage at the molecular level. Application to I-125 seeds in water.***
Ref. Applied radiation and isotopes
Volumen: 140 pags. 163-170. Fecha: Mayo 2018
- Autores (p.o. de firma): A. Ferrer, M.Shaw y A. Williard
Título: ***Física Nuclear y de Partículas***
Fecha: 2013
Número de páginas: 520
Editorial: UNED 6104403GR02A01
Lugar de publicación: Madrid
- Autores (p.o. de firma): M.Shaw y A. Williard
Título: ***Física Nuclear y de Partículas: Problemas Resueltos***
Fecha: 2013
Número de páginas: 262
Editorial: UNED 6104403GR01A01
Lugar de publicación: Madrid
- Autores (p.o. de firma): M.C. Fuss, A. Muñoz, J.C. Oller, F. Blanco, A. Williard, P. Limão-Vieira, M.J.G. Borge, O. Tengbland, C. Huerga, M. Téllez and G. García
Título: ***Energy deposition by a ¹⁰⁶Ru/¹⁰⁶Rh eye applicator simulated using LEPTS, a Low-Energy Particle Track Simulation***
Ref. Applied Radiation and Isotopes
Volumen: 69 pags. 1198-1204 Fecha: Abril 2011
Lugar de publicación: Holland
- Autores (p.o. de firma): M.C. Fuss, A. Muñoz, J.C. Oller, F. Blanco, P. Limão-Vieira, A. Williard, C. Huerga, M. Téllez and G. García
Título: ***Energy deposition model for I-125 photon radiation in water***
Ref. Eur. Phys. J. D
Volumen: 60 pags. 203-208 Fecha: Octubre 2010



Lugar de publicación: Germany

- Autores (p.o. de firma): B. de Celis, R. de la Fuente, A. Williard, B. de Celis Alonso
Título: ***Coincidence measurements in $\alpha/\beta/\gamma$ spectrometry with phoswich detectors using digital pulse shape discrimination analysis***
Ref. Nucl. Inst. Meth. Phys. Res. A
Volumen: A 580 pags. 206-209 Fecha: Mayo 2007
Lugar de publicación: Holland
- Autores (p.o. de firma): M. Shaw, A. Báguena, A. Williard, G. García
Título: ***Development of an X-Ray installation for the study of secondary electrons: preliminary measurements and calculations***
Ref. Proceedings of “Second European IRPA Congress on radiation Protection”
Volumen: P-324 pag. 1-17 Fecha: Mayo 2006
Lugar de publicación: Paris
- Autores (p.o. de firma): A. Muñoz, A. Williard, G. García, J.M. Pérez
Título: ***A new approach to the modeling of low energy gamma photon interaction in air***
Ref. Proceedings of “11th International Congress of the International Radiation Protection Association”
Volumen: 3b28 pag. 1-10 Fecha: Mayo 2004
Lugar de publicación: Madrid
- Autores (p.o. de firma): A. Roldán, J.M. Pérez, A. Williard, F. Blanco and G. García
Título: ***Energy deposition model for low-energy electrons (0.01 – 10 keV) in air***
Ref. Journal of Applied Physics
Volumen: 95 Páginas, inicial: 5865 final: 5870 Fecha: Mayo 2004
Lugar de publicación: USA

C.2. Congress,

- Título: *Low energy particle track simulation for biomedical applications*
Autores: M.C. Fuss, A.G. Sanz, A. Muñoz, J.C. Oller, F. Blanco, A. Williard, C. Huerga, M. Tellez and G. García
Tipo de participación: Oral
Congreso: “Radam 2010” (Radiation damage in biomolecular systems)
Lugar de celebración: Madrid Fecha: 30 de junio – 4 de julio de 2010
- Título: *Analysis and modeling of secondary electron generation in condensed biomolecular systems*
Autores: A.G. Sanz, M.C. Fuss, A. Williard, C. Cruz, A. Perea, M.J.G. Borge, O. Tengbland, Y. Prezado, A. Muñoz, F. Blanco and G. García
Tipo de participación: Poster
Congreso: “Radam 2010” (Radiation damage in biomolecular systems)
Lugar de celebración: Madrid Fecha: 30 de junio – 4 de julio de 2010
- Título: *LEPTS, una simulación de trayectorias de partículas de baja energía, en aplicaciones biomédicas*
Autores: M.C. Fuss, A.G. Sanz, A. Muñoz, J.C. Oller, F. Blanco, A. Williard, C. Huerga, M. Tellez y G. García
Tipo de participación: Oral
Congreso: XXXIII Reunión Bienal de la Real Sociedad Española de Física
Lugar de celebración: Santander Fecha: 19-23 de septiembre de 2011
- Título: *Estudio de la absorción de las emisiones del Na²² por distintos materiales.*
Autores: A. Williard, A. Muñoz, F. Blanco y G. García
Tipo de participación: Oral
Congreso: XXXIII Reunión Bienal de la Real Sociedad Española de Física
Lugar de celebración: Santander Fecha: 19-23 de septiembre de 2011

C.3. Research projects,

- Título del proyecto: **“Radiological Effect of RADicals and MolEcular Radiosensitisers (REFRAMER)”**
Entidad financiadora: MICINN (PID20198-104727RB-C21)
Entidades participantes: CSIC - UNED – CIEMAT- Universidad Complutense de Madrid
Duración, desde: 2019 hasta: 2022
Investigador responsable: G. García Gómez-Tejedor (CSIC)
Número de investigadores participantes: 10
- Título del proyecto: **“Interacción de partículas de baja energía y radicales en aplicaciones biomédicas de la radiación”**
Entidad financiadora: MINECO (FIS2016-80440-p)
Entidades participantes: CSIC - UNED – CIEMAT- Universidad Complutense de Madrid
Duración, desde: 2017 hasta: 2019
Investigador responsable: G. García Gómez-Tejedor (CSIC)
Número de investigadores participantes: 10
- Título del proyecto: **“Interacción de la radiación a escala nanométrica y sus aplicaciones en radioterapia y radiodiagnóstico”**
Entidad financiadora: MINECO (FIS2012-31230)
Entidades participantes: CSIC - UNED – CIEMAT- Universidad Complutense de Madrid
Duración, desde: 2012 hasta: 2016
Investigador responsable: G. García Gómez-Tejedor (CSIC)
Número de investigadores participantes: 10
- Título del proyecto: **“Estudio de procesos atómicos y moleculares con aplicaciones en el uso biomédico de las radiaciones”**
Entidad financiadora: CICYT (FIS2009-10245)
Entidades participantes: CSIC - UNED – CIEMAT- Universidad Complutense de Madrid
Duración, desde: 2009 hasta: 2012
Investigadora responsable: G. García Gómez-Tejedor (CSIC)
Número de investigadores participantes: 7
- Título del proyecto: **“Estudio del daño por radiación producido por electrones secundarios en sistemas biomoleculares”**
Entidad financiadora: CSN
Entidades participantes: UNED
Duración, desde: 2004 hasta: 2009
Investigadora responsable: M. Shaw Martos (UNED)
Número de investigadores participantes: 2
- Título del proyecto: **“Interacción de electrones secundarios con la materia y sus implicaciones en el daño por radiación”**
Entidad financiadora: CICYT (BMF04648/FISI)
Entidades participantes: CSIC - UNED – CIEMAT- Universidad Complutense de Madrid
Duración, desde: 2004 hasta: 2007
Investigador responsable: G. García Gómez-Tejedor (CSIC)
Número de investigadores participantes: 7

Fecha del CVA	26/08/2024
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Parte A. DATOS PERSONALES

Nombre *			
Apellidos *			
Sexo *		Fecha de Nacimiento *	
DNI/NIE/Pasaporte *		Teléfono *	
URL Web			
Dirección Email			
Identificador científico	Open Researcher and Contributor ID (ORCID) *		
	Researcher ID		
	Scopus Author ID		

* Obligatorio

A.1. Situación profesional actual

Puesto	Profesor Titular de Universidad		
Fecha inicio	2022		
Organismo / Institución	Universidad de Salamanca		
Departamento / Centro	Física Fundamental / Ciencias		
País		Teléfono	
Palabras clave	220000 - Física		

A.2. Situación profesional anterior

Periodo	Puesto / Institución / País
2021 - 2022	Profesor Contratado Doctor Permanente I3 / Universidad de Salamanca

Parte C. MÉRITOS MÁS RELEVANTES

C.1. Publicaciones

AC: Autor de correspondencia; (nº x / nº y): posición firma solicitante / total autores. Si aplica, indique el número de citas

- Artículo científico.** H. Pais; (2/4) C. Albertus; M. Á. Pérez; C. Providência. 2023. Influence of the tetra-neutron on the EoS under core-collapse supernova and heavy-ion collision conditions. *Astronomy and Astrophysics*. EDP Sciences. 679, pp.A113-1-A113-10. ISSN 0004-6361.
- Artículo científico.** D. Barba-González; M. A. Pérez-García; M. A. Pérez-García. 2022. Crystallization in single- and multicomponent neutron star crusts. *Physical Review C*. American Physics Society. 106-6, pp.065806-1-065806-1. ISSN 0031-899X. <https://doi.org/10.1103/PhysRevC.106.065806>
- Artículo científico.** M. A. Pérez-García; L. Izzo; D. Barba-González; et al; J. Sollerman. 2022. Hubble constant and nuclear equation of state from kilonova spectro-photometric light curves. *Astronomy and Astrophysics*. EDP Sciences. 666-A67, pp.1-20. ISSN 0004-6361. <https://doi.org/10.1051/0004-6361/202243749>
- Artículo científico.** M. Ángeles Pérez-García; H. Grigorian; C. Albertus; D. Barba; J. Silk. 2022. Cooling of Neutron Stars admixed with light dark matter: A case study. *Physics Letters B*. Elsevier. 827, pp.136937-136942.
- Artículo científico.** A. Herrero; M. A. Pérez García; J. Silk; C. Albertus. 2019. Dark matter and bubble nucleation in old neutron stars. *Physical Review D*. American Physical Society. 100-10, pp.103019-1-103019-9. ISSN 2470-0010. <https://doi.org/10.1103/PhysRevD.100.103019>

- 6 **Artículo científico.** O. Ivanytskyi; M. A. Pérez; V. Sagun; C. Albertus. 2019. Second look to the Polyakov loop Nambu–Jona-Lasinio model at finite baryonic density. *Physical Review D. American Physics Society.* 100-10, pp.103020-1-103020-11.
- 7 **Artículo científico.** O. Ivanytskyi; M. A. Pérez; C. Albertus. 2019. Tetraneutron condensation in neutron rich matter. *European Physics Journal A. Elsevier.* 55-10, pp.184-194.
- 8 **Artículo científico.** Tomasz Rembiazsz; Martin Obergaulinger; Manuel Masip; M. Ángeles Pérez-García; Miguel-Ángel Aloy; Conrado Albertus. 2018. Heavy sterile neutrinos in stellar core-collapse. *Physical Review D. American Physics Society.* 90-10, pp.103101.
- 9 **Artículo científico.** A. de Angelis; V. Tatischeff; I. A. Grenier; C. Albertus. 2018. Science with e-ASTROGAM: A space mission for MeV–GeV gamma-ray astrophysics. *Journal of High Energy Astrophysics. Elsevier.* 19, pp.1-106.
- 10 **Artículo científico.** Boehm, C.; C. Albertus; Krone-Martins, A. et al.2017. Theia: Faint objects in motion or the new astrometry frontier.
- 11 **Artículo científico.** C. Albertus; M. Masip; M. A. Pérez-García. 2015. Production of unstable heavy neutrinos in proto-neutron stars. *Physics Letters B. Elsevier.* 751, pp.209-214.
- 12 **Artículo científico.** (1/4) C. Albertus; E. Ruíz Arriola; I. P. Fernanda; J. L. Goity. 2015. Heavy baryons in the large N_c limit. *Physics Letters B. Elsevier.* 750, pp.331-337. Spires (1)
- 13 **Artículo científico.** I. Ruiz Simo; C. Albertus; J. E. Amaro; M. B. Barbaro; J. A. Caballero; T. W. Donnelly. 2014. Angular distribution in two-particle emission induced by neutrinos and electrons. *Physical Review D. American Physical Society.* 90-5, pp.053010-053018. Spires (7)
- 14 **Artículo científico.** C. Albertus; E. Hernandez; C. Hidalgo-Duque; J. Nieves. 2014. Bs to K semileptonic decay from an Omn`es improved constituent quark model. *Physics Letters B. Elsevier.* B738, pp.144. Spires (3)
- 15 **Artículo científico.** I. Ruiz Simo; C. Albertus; J. E. Amaro; M. B. Barbaro; J. A. Caballero; T. W. Donnelly. 2014. Relativistic effects in two-particle emission for electron and neutrino reactions. *Physical Review D. American Physical Society.* 90-3, pp.033012-033035. Spires (10)
- 16 **Artículo científico.** C. Albertus; E. Hernandez; J. Nieves. 2014. B to rho semileptonic decays and $|\text{Vub}|$. *Physical Review D. American Physical Society.* 90-1, pp.013017-013028. Spires (4)
- 17 **Artículo científico.** C. Albertus. 2014. Weak decays of $\bar{b} B_s$ mesons. *Physical Review D. American Physical Society.* 89, pp.065042-065062. ISSN 1550-7998. Spires (6)
- 18 **Artículo científico.** J. Segovia; C. Albertus; D. R. Entem; F. Fernández; E. Hernández. 2012. Nonleptonic B to $D^{(*)}D^{(*)}_s$ decays and the nature of the orbitally excited charmed-strange mesons. *Physical Review D. American Physical Society.* 84-9, pp.014010-014021. ISSN 1550-7998. Spires (5)
- 19 **Artículo científico.** C. Albertus; E. Hernández; J. Nieves. 2012. Exclusive c to s, d semileptonic decays of ground-state spin-1=2 and spin-3=2 doubly heavy cb baryons. *Physical Review D. American Physical Society.* 85-9, pp.094035-094054. ISSN 1550-7998. Spires (7)
- 20 **Artículo científico.** J. Segovia; C. Albertus; D. R. Entem; F. Fernández; E. Hernández; M. A. Perez Garcia. 2011. Semileptonic B and Bs decays into orbitally excited charmed mesons. *Physical Review D. American Physical Society.* 84-9, pp.094029-094047. ISSN 1550-7998. Spires (22)
- 21 **Artículo científico.** C. Albertus; E. Hernandez; J. Nieves. 2011. Exclusive c,s,d semileptonic decays of ground-state spin-1/2 doubly charmed baryons. *Physics Letters B. Elsevier.* 704, pp.499-509. ISSN 0370-2693. Spires (9)
- 22 **Artículo científico.** C. Albertus; Y. Aoki; P. A. Boyle; et al; O. Witzel. 2010. Neutral B-meson mixing from unquenched lattice QCD with domain-wall light quarks and static b quarks. *Physical Review D. American Physical Society.* 82-1, pp.014505-014034. ISSN 1550-7998. Spires (44)
- 23 **Artículo científico.** C. Albertus; E. Hernández; J. Nieves. 2010. Hyperfine mixing in electromagnetic decay of doubly heavy bc baryons. *Physics Letters B. Elsevier.* 690, pp.265-271. ISSN 0370-2693. Spires (13)

- 24 **Artículo científico.** C. Albertus; E. Hernandez; J. Nieves. 2009. Hyperfine mixing in $b \rightarrow c$ semileptonic decay of doubly heavy baryons. Physics Letters B. Elsevier. 683, pp.21-25. ISSN 0370-2693. Spires (17)
- 25 **Artículo científico.** C. Albertus; E. Hernández; J. Nieves; J. M. Verde-Velasco. 2007. Static properties and semileptonic decays of doubly heavy baryons in a nonrelativistic quark model. European Physical Journal A. Springer-Verlag. 32, pp.183-199. ISSN 1434-6001. Spires (46)
- 26 **Artículo científico.** C. Albertus; E. Hernandez; J. Verde-Velasco; J. Nieves. 2005. Study of the strong Σ_c to Λ_c π , Σ_c^* to Λ_c π and Ξ_c^* to Ξ_c π decays in a nonrelativistic quark model. Physical Review D. American Physical Society. 72-9, pp.094022-094029. ISSN 1550-7998. Spires (15)
- 27 **Artículo científico.** C. Albertus; J. Flynn; E. Hernandez; J. Verde-Velasco; J. Nieves. 2005. Semileptonic B to π decays from an Omnès improved nonrelativistic constituent quark model. Physical Review D. American Physical Society. 72-3, pp.033002-033016. ISSN 1550-7998. Spires (23)
- 28 **Artículo científico.** C. Albertus; E. Hernández; J. Verde-Velasco; J. Nieves. 2005. Study of the leptonic decays of pseudoscalar B, D and vector B^* , D^* mesons and of the semileptonic B to D and B^* to D^* decays. Physical Review D. American Physical Society. 71-11, pp.113006-113021. ISSN 1550-7998. Spires (25)
- 29 **Artículo científico.** C. Albertus; E. Hernández; J. Nieves. 2005. Nonrelativistic quark model and HQET combined study of semileptonic decays of Λ_b and Σ_b baryons. Physical Review D. American Physical Society. 71-1, pp.014012-014026. ISSN 1550-7998. Spires (27)
- 30 **Artículo científico.** C. Albertus; J. Amaro; E. Hernández; J. Nieves. 2004. Charmed and bottom baryons: a variational approach based on heavy quark symmetry. Nuclear Physics A. Elsevier. 740, pp.333-361. ISSN 0375-9474. Spires (47)
- 31 **Artículo científico.** C. Albertus; J. Amaro; J. Nieves. 2003. Pionic decay of L hypernuclei in a continuum shell model. Physical Review C. American Physical Society. 67-3, pp.034604-034613. ISSN 0556-2813. Spires (14)
- 32 **Artículo científico.** C. Albertus; J. Amaro; J. Nieves. 2002. What Does the Free Space $\Lambda\Lambda$ Interaction Predict for $\Lambda\Lambda$ Hypernuclei?. Physical Review Letters. American Physical Society. 89-3, pp.032501-1-032501-4. ISSN 0031-9007. Spires (27)

C.3. Proyectos y Contratos

- 1 **Proyecto.** ASTROFISICA DE ESTRELLAS DE NEUTRONES EN LA ERA MULTIMENSAJERO. Ministerio de Ciencia e Innovación. María de los Ángeles Pérez García. (Universidad de Salamanca). 01/09/2023-31/05/2026. 37.500 €.
- 2 **Proyecto.** PID2019-107778GB-I00, Astrofísica de estrellas de neutrones: retos actuales y futuros (2 investigadores). Ministerio de Ciencia e Innovación. (Universidad de Salamanca). 01/06/2020-31/05/2023. 18.150 €.
- 3 **Proyecto.** Avanzando en el conocimiento de la materia quark y hadrónica. Retos actuales y futuros. Programa I. Programa de financiación de grupos de investigación. Proyectos de Investigación. Modalidad C1 del Plan Estratégico y de Transeferencia de Conocimiento de la Universidad de Salamanca. (Universidad de Salamanca). 01/07/2020-01/09/2020. 3.000 €.

C.5. Estancias en centros de I+D+i públicos o privados

- 1 Universidade de Coimbra. Centro de Física Computacional. Coimbra. 15/10/2012-15/12/2012. 2 meses. Invitado/a.
- 2 Universidad de Salamanca. Facultad de Ciencias. 01/09/2009-31/08/2012. 3 años. Contratado/a.
- 3 Consejo Superior de Investigaciones Científicas. Instituto de Física Corpuscular. Valencia. 16/01/2009-31/08/2009. 7 meses - 15 días. Contratado/a.
- 4 University of Southampton. School of Physics and Astronomy. 15/09/2006-30/09/2008. 2 años - 15 días. Posdoctoral.

- 5 Universidad de Granada. Facultad de Ciencias. 01/07/2005-30/06/2006. 1 año. Contratado/a.
- 6 Universidad de Granada. Facultad de Ciencias. 01/07/2001-30/06/2005. 4 años. Doctorado/a.
- 7 Universidad de Turín. Departamento de Física Teórica. 02/05/2003-03/07/2003. 2 meses. Invitado/a.
- 8 Universidad de Salamanca. Facultad de Ciencias. 18/11/2002-14/12/2002. 1 mes. Invitado/a.
- 9 Universidad de Granada. Facultad de Ciencias. España. Granada. Desde 01/02/2013. 2 años. Contratado/a.

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	Eva María		
Family name	Fernández Sánchez	Date:	
ID number			
Open Researcher and Contributor ID (ORCID) (*)	0000-0003-2085-0478		

(*) *Mandatory*

A.1. Current position

Position	Associate Professor (Titular de Universidad)		
Initial date	30/09/2020		
Institution	Universidad Nacional de Educación a Distancia (UNED)		
Department/Center	Departamento de Física Fundamental	Facultad de Ciencias	

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

Period	Position/Institution/Country/Interruption cause
05/03/2020-29/09/2020	Tenured Professor / UNED / Spain
01/11/2015-04/03/2020	Ramón y Cajal contract / UNED / Spain
01/11/2012-31/10/2015	Postdoc / UNED / Spain
16/03/2008-31/10/2012	Postdoc / Instituto de Ciencia de Materiales de Madrid (ICMM) / Consejo Superior de Investigaciones Científicas (CSIC) / Spain
01/03/2006-29/02/2008	Postdoc / Technical University of Denmark / Denmark
01/01/2002-31/12/2005	Predoc FPU (beca de formación de personal universitario) / Universidad de Valladolid / Spain

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
Physics degree	Universidad de Valladolid	2001
Physics PhD	Universidad de Valladolid	2005

(Include all the necessary rows)

Part B. CV SUMMARY (max. 5000 characters, including spaces)

- 44 JCR articles (most in Q1). Citations: 2050. H-index: 18
- 5 articles with more than 100 citations.
- PI of a national project (along with Javier Rodríguez Laguna).
- PI of a research group at UNED.

Trajectory. I graduated in Physics at Universidad de Valladolid in 2001. Then I started my research career with a FPU grant from the Spanish Ministry of Science to work on the PhD at the department of “Física Teórica, Atómica y Óptica” at Universidad de Valladolid supervised by Prof. Luis C. Balbás. In December 2005 I obtained the PhD degree with the highest marks. My PhD was awarded Special Doctorate Award by Universidad de Valladolid in 2007. From March 2006 to March 2008 I joined as postdoc at the Technical University of Denmark for two years. From March 2008 to October 2018 I worked as a researcher at Insituto de Ciencia de Materiales de Madrid (ICMM) which is part of the Consejo Superior de Investigaciones Científicas (CSIC), firstly with a JaeDoc Postdoctoral contract and then with a Comunidad de Madrid postdoctoral contract associated to project. Since November 2012 I develop my research work at the department of Física Fundamental of Universidad Nacional de Educación a Distancia, initially with a competitive postdoctoral contract of UNED and since November



2015 with a Ramón y Cajal contract. Finally, I obtained a permanent position in the same department in March 2020.

Scientific publications. I have published 44 papers in JCR journals (one Angew. Chem. Int., one Physical Review Letters and seven Physical Review B), which have received more than 2000 citations altogether. Fifteen of my papers have received more than 25 citations (one of them has received more than 500 citations) and my Hirsch index is $h=18$.

Funding. I have participated in 12 research projects, one international project funded by the Danish Research Agency and 6 national projects (one of them in collaboration with Osnabrück University, Germany). At this moment I am PI of a national project (Ref. PID2019-105182GB-I00). In 2017 and in 2019 I was assigned a 1 year undergraduate contract under the competitive Programa de Garantía Juvenil de la Comunidad de Madrid.

Since 2022 I am evaluator of national project for the Agencia Estatal de Investigación.

Awards. I was awarded the L'Oreal-UNESCO prize for Women in Science in Spain 2017, and the Prize of the Real Sociedad Española de Física – Fundación BBA for Young Researchers in theoretical physics in its 21th edition (year 2007) in 2008.

Other contributions. I am PI of the research group of the Statistical Mechanics of Complex Systems group at UNED.

I have supervised four master thesis and four bachelor thesis.

From 2018 I am an editorial board member for "Revista Española de Física".

Recently, I have carried out scientific outreach such as giving a conference at the academic act of San Alberto Magno for the Faculty of Science of UNED 2018, giving a Masterclass within the "Stem Talent Girl Proyecto de innovación educativa" program in Valladolid (February 2019) and publishing an article at "Revista Española de Física".

Research lines.

My research is focused on the analysis of the structural, electronic and thermodynamic properties, by means of first-principles simulation methods, of new tentative materials for applications in catalysis.

I work on two research lines:

1. Nanometric cluster

Improvement and proposal of catalysts for the adsorption of H_2 , O_2 , CO , NO on doped clusters. The main interest is the search for new catalysts more active that reduce air pollutant emissions into the atmosphere and more efficient materials for hydrogen storage. The analysis of the role played by the dopant atom in the reactivity of these aggregates according to their size and composition allows to improve or design new more efficient catalysts for the oxidation of CO and NO *decomposition* (avoiding or reducing their emission to the atmosphere) or for H storage (the main difficulty for the use of hydrogen as an energy source is its storage in a safe, reliable and compact way).

2. Analysis of the liquid-solid interface: the wetting problem in smooth and rough surfaces.

This problem presents a great technological interest as the partial or complete wetting of the surface by the fluid is one of the main influences on a catalyst efficiency. A partial wetting situation, where the fluid only wet a part of the catalyst, implies a low use of the catalyst, as well as the formation of hot spots and, in addition, affects its selectivity.

Part C. RELEVANT MERITS (sorted by typology)

C.1. Publications

1. E. M. Fernández and L. C. Balbás. *Adsorption of multiple NO molecules on Au_{10}^- and Au_9Zn^- planar clusters. A comparative DFT study.* Phys. Chem. Chem. Phys. 25, 17176 (2023).

2. E. M. Fernández and L. C. Balbás. *Interactions of nitric oxide molecules with pure and oxidized silver clusters Ag_n^\pm/Ag_nO^\pm ($n=11-13$): A computational study*. J. of Chem. Phys. 157, 074310 (2022).

In this paper we show that species Ag_n^\pm and Ag_nO^\pm with odd number of electrons are more reactive toward the adsorptions of one and two NO molecules than their neighbors.

3. E. M. Fernández, S. N. Santalla, J. E. Alvarellos, J. Rodríguez-Laguna. *Nanowire reconstruction under external magnetic fields*. J. of Chem. Phys. 153, 244106 (2020).

Can nanowires reconstruct differently in the presence of external magnetic (or electric) fields? After our calculations, we can conjecture that this can indeed be the case.

4. E. M. Fernández and L. C. Balbás. *Multiple adsorption of molecular oxygen on small Au/Pd cationic clusters at finite temperature. A van der Waals density functional study*. J. of Chem. Phys. 114, 224308 (2016).

The reactivity of Au_n^+ cluster toward O_2 is strongly enhanced when Au atoms are changed by Pd ones for all cluster sizes.

5. E. Chacón, E. M. Fernández and P. Tarazona. *Effect of dispersion forces on the capillary-wave fluctuations of liquid surfaces*. Phys. Rev. E (89), 042406 (2014).

Shows molecular dynamics evidence for the nonanalytic effects of the long-range dispersion forces on the capillary waves fluctuations of a Lennard-Jones liquid surface.

6. E. M. Fernández, E. Chacón, P. Tarazona, A. O. Parry and C. Rascón. *Intrinsic Fluid Interfaces and Nonlocality*. Phys. Rev. Lett. 111, 096104 (2013).

Explores the local or nonlocal nature of the interfacial Hamiltonians that are used to analyze the structure and fluctuations of a liquid-gas interface.

7. E. M. Fernández, A. Vega and L. C. Balbás. *Theoretical study of Al_nV^+ clusters and their interaction with Ar*. J. Chem. Phys. 139, 214305 (2013).

DFT calculations confirms that the V atoms on Al_nV^+ clusters becomes encapsulated at the critical size of 17 atoms as suggested photofragmentation mass experiments.

8. E. M. Fernández et. al. (1/11) *Scaling relationships for adsorption energies on transition metal oxide, sulfide, and nitride surfaces*. Ang. Chem. Int. ed. 107, 4683 (2008).

We propose a method that may facilitate the description of the bonding of gas molecules to transition metal oxides, sulfides, and nitrides by density functional theory calculations.

9. E. M. Fernández, J. M. Soler and L. C. Balbás. *Planar and cage-like structure of gold clusters: Density-functional pseudopotential calculations*. Phys. Rev. B 73, 235438 (2006). In this paper we analyze the influence of the exchange-correlation functional (LDA and GGA) in the structure of formation of planar and pure surface (cage-like) clusters.

10. E. M. Fernández, J. M. Soler, I. L. Garzón and L. C. Balbás. *Trends in the structure and bonding of noble metal clusters*. Phys. Rev. B 70, 165303-14 (2004).

Analysis of the differences and similarities between small clusters of noble metals (gold, silver and copper; both neutral and charged).

C.2. Congress, indicating the modality of their participation (invited conference, oral presentation, poster)

1 *Adsorption of multiple NO molecules on Au_{10}^- and Au_9Zn^- planar clusters. A comparative DFT study*. ISSPIC XXIII, Berlin, Germany (2023). Poster presentation.

2. *H_2 adsorption on Al_nCo^+ clusters*. Gordon Research Conference on Clusters and Nanostructures. Les Diablerets, Switzerland (2019). Poster presentation.

3. *Multiple adsorption of molecular oxygen on small Au/Pd cationic clusters at finite temperature. A van der Waals density functional study*. ISSPIC XVIII, Jyväskylä, Finland (2016). Poster presentation.



4. *Static polarizability of Ar-AuX complexes (X = F, Hg) and Au_n clusters. DFT calculations with a non local correlation van der Waals functional compared to GGA results.* ISSPIC XV, Oaxaca, Mexico (2010). Oral presentation.
5. *Aplicación del ISM al estudio de la transición de mojado.* FISES09, Huelva, Spain (2009). Oral presentation.
6. *O₂ adsorption on cationic gold clusters pure and doped with a 3d transition metal.* XXX Reunión bienal de la RSEF, Ourense, Spain (2005). Oral presentation.
7. *Theoretical study of O₂ and CO adsorption on gold clusters in gas phase and supported on alumina nano-particles and surfaces.* XXX Reunión bienal de la RSEF, Ourense, Spain (2005). Oral presentation.
8. *Trends in the structure and bonding of pure and doped noble metal clusters. Application to O₂ and CO adsorption.* Quantum system in chemistry & physics, Les Houches, France (2004). invited conference.
9. *Trends in the structure and bonding of neutral and charged noble metal clusters. Siesta-Meeting,* Madrid, Spain (2004). Oral presentation.
10. *Tendencias en la estructura atómica y enlace químico de agregados neutros y cargados de metales nobles.* Segunda reunión mexicana de físico-química teórica, Guanajuato, Mexico (2003). Oral presentation.

C.3. Research projects, indicating your personal contribution. In the case of young researchers, indicate lines of research for which they have been responsible.

1. *Quantum Complex Systems: Fundamentals and Applications.* Ministerio de Ciencia, Innovación e Universidades. 06/2019-05/2022 PI: Eva María Fernández (UNED) and Javier Rodríguez-Laguna (UNED) Role: IP1.
2. *Structure and dynamics of complex fluids and their interfaces.* Ministerio de Ciencia e Innovación. 2011-2013; Enrique Chacón Fuertes (CSIC). Researcher.
3. *Structure, dynamics and electronic properties of atomic clusters, nanoalloys, interfaces and metallic liquids of technological interest in spintronics, catalysis and nuclear reactors.* Junta de Castilla y León. 2011-2013. Andrés Aguado Rodríguez (UVa). Researcher.
4. *Modeling and simulation of complex systems. Comunidad de Madrid. 2010-2013. Enrique Lomba García (CSIC).* Researcher.
5. *Electronic and morphological properties of nanostructures materials of interest in spintronics, catalysis and new nanoalloys.* Ministerio de Ciencia e Innovación. 2009-2011. Andrés Vega (UVa). Researcher.
6. *New electrode materials for hydrogen evolution.* Danish Research Agency, Ministry of Science Technology and Innovation (Dinamarca). 2005-2007. Ib Chorkendorff (UTD). Researcher.
7. *Theoretical study of structural, electronic and thermal properties of nanodimensional systems of technological interest.* Ministerio de Ciencia y Tecnología. 2005-2007. Andrés Vega (UVa). Researcher.



Part A. PERSONAL INFORMATION		CV date	12/09/2023
First and Family name	Juan Antonio Caballero Carretero		
ID number			
Researcher numbers	Researcher ID	K-6609-2014	
	ORCID code	0000-0001-9691-0874	
	Scopus	35556445900	

A.1. Current position

Institution	University of Seville		
Department	Atomic, Molecular and Nuclear Physics		
Address and Country	Seville, Andalusia, Spain		
Phone number	E-mail	jac@us.es	
Current position	Full Professor ("Catedrático")	From	21/11/2007
UNESCO code	220719		
Key words	Electroweak interactions, hadron and nuclear structure, electron and neutrino scattering, parity violation		

A.2. Education

Degree/PhD	University	Year
Degree ("Licenciatura")	University of Extremadura	1985
PhD	Autonomous University of Madrid	1989

A.3. JCR articles, h Index, thesis supervised...

Six-year research ("sexenios de investigación"): 6. Last one: 2016-2021.

Five-year teaching activities ("quinquenios de docencia"): 6

PhD thesis supervised (last 10 years): 2.

Publ. in scientific journals: 146 (WoS), 149 (Scopus), 160 (ORCID).

Total cites: 3543 (WoS), 3702 (Scopus).

H-index: 36 (WoS), 36 (Scopus).

Publications with high impact factor: 2 Physics Reports (25.010 impact factor), 6 Physical Review Letters (7.489) y 12 Physics Letters B (5.043).

Part B. CV SUMMARY (max. 3500 characters, including spaces)

My research activities have focused on the study of hadron and nuclear systems through the analysis of electroweak scattering processes at intermediate energies. In particular, I have carried out studies on electron-nucleus scattering reactions by analyzing kinematic regions corresponding to different reaction mechanisms: quasi-elastic scattering, delta and higher resonance production, meson-exchange currents, etc. In all cases, we have evaluated the observables of interest: cross sections and response functions, including polarization degrees of freedom. Fully relativistic studies, with kinematic and dynamic relativistic effects embodied, have been performed by comparing the theoretical predictions with data. Some relevant examples are: spectroscopic factors, reduced cross sections, polarization ratios, nucleon momentum distributions, nuclear structure functions, nucleon form factors, etc. Particular interest in the analysis of electron-nucleus scattering processes has been devoted to the investigation of parity violating effects linked to the weak interaction (see Phys. Rep. 524, 1-35, 2013). All these studies have been published in high impact factor peer-review journals (see, e.g., Research ID profile).

In the last years, my main research activities have been related to the study of neutrino-nucleus and nucleon interaction. This topic is of great interest; not only does it provide precise information on neutrino oscillations, but it also has important implications in nuclear astrophysics. This is clearly shown through the significant number of international labs and research centers where neutrino-nucleus experiments are carried out. The analysis of data requires the use of theoretical models capable of providing a good, precise enough, description



of the neutrino-nucleus interaction. This means not only to describe the reaction mechanism (or elementary vertex) but also the complex nuclear structure of the target. In this sense, it is essential to include effects beyond the impulse approximation, such as meson exchange currents, two-particle two-hole contributions, correlations, radiative corrections, etc. Also, because of the high energies involved in the experiments, it is mandatory to make use of a fully relativistic description of the process that includes kinematical and dynamical relativistic effects linked to the reaction mechanism/nuclear structure. The validity of the so-called scaling phenomenon has been clearly proved through the analysis of electron-nucleus scattering data. We have performed detailed investigations on this topic and applied it to the case of neutrino reactions. This approach has allowed us to study neutrino scattering processes without relying upon any particular nuclear model. The results, in very good agreement with data, have been presented and discussed in detail in high impact international scientific journals (see list of publications).

These projects have led to three Ph.D. theses, two of them with 'international mention' and 'extraordinary doctoral prize' from the University of Seville. Of these two, one (Raúl González) received the 'third prize for the best national PhD thesis in nuclear physics' by the Spanish Royal Society of Physics (2016 call), and the other (Guillermo Megías) has been selected as the most relevant PhD thesis in Theoretical Nuclear Physics (2019 GEFN-ATI call). Likewise, our results have been presented in a large number of scientific events. The quality and real impact of our work is clearly demonstrated by the number of relevant publications and citations received.

Part C. RELEVANT MERITS

C.1. Publications (10 cited publications [WOS] in the last years)

1. Title: Meson-exchange currents and quasielastic neutrino cross sections in the superscaling approximation model. Author(s): Amaro, J. E.; Barbaro, M. B.; Caballero, J. A.; et al. Physics Letters B, Volume: 696 Issue: 1-2 Pages: 151-155 Published: JAN 24 2011. Times Cited: 106, DOI: 10.1016/j.physletb.2010.12.007.
2. Title: Relativistic analyses of quasielastic neutrino cross sections at MiniBooNE kinematics Author(s): Amaro, J. E.; Barbaro, M. B.; Caballero, J. A.; et al. Physical Review D Volume: 84 Issue: 3 Published: AUG 8 2011. Times Cited: 68, DOI: 10.1103/PhysRevD.84.033004.
3. Title: Meson-Exchange Currents and Quasielastic Antineutrino Cross Sections in the Superscaling Approximation. Author(s): Amaro, J. E.; Barbaro, M. B.; Caballero, J. A.; et al. Physical Review Letters Volume: 108 Issue: 15 Published: APR 12 2012. Times Cited: 62, DOI: 10.1103/PhysRevLett.108.152501.
4. Title: Extensions of superscaling from relativistic mean field theory: The SuSAv2 model. Author(s): Gonzalez-Jimenez, R.; Megias, G. D.; Barbaro, M. B.; et al. Physical Review C Volume: 90 Issue: 3 Published: SEP 15 2014. Times Cited: 65, DOI: 10.1103/PhysRevC.90.035501.
5. Title: Charged-current neutrino-nucleus reactions within the superscaling meson-exchange current approach. Author(s): Megias, G.D.; Barbaro, M.B.; Caballero, J.A.; Donnelly, T.W.; Ruiz-Simo, I. Physical Review D 94, 093004 (2016). Times cited: 52. DOI: [10.1103/PHYSREVD.94.093004](https://doi.org/10.1103/PHYSREVD.94.093004)
6. Title: Relativistic Descriptions of Final-State Interactions in Charged-Current Quasielastic Neutrino-Nucleus Scattering at MiniBooNE Kinematics. Author(s): Meucci, Andrea; Barbaro, M. B.; Caballero, J. A.; et al. Physical Review Letters Volume: 107 Issue: 17 Published: OCT 17 2011. Times Cited: 48, DOI: 10.1103/PhysRevLett.107.172501.
7. Title: Meson-exchange currents and quasielastic predictions for charged-current neutrino-C-12 scattering in the superscaling approach. Author(s): Megias, G. D.; Donnelly, T. W.;



Moreno, O.; et al. Physical Review D Volume: 91 Issue: 7 Published: APR 7 2015. Times Cited: 52, DOI: [10.1103/PhysRevD.91.073004](https://doi.org/10.1103/PhysRevD.91.073004).

8. Title: Inclusive electron scattering within the SuSAv2 meson exchange current approach. Author(s): Megias, G.D.; Amaro, J.E.; Barbaro, M.B; Caballero, J.A.; Donnelly, T.W. Physical Review D 94, 013012 (2016). Times cited: 46, DOI: [10.1103/PHYSREVD.94.013012](https://doi.org/10.1103/PHYSREVD.94.013012)

9. Title: Parity violation in elastic electron-nucleon scattering: Strangeness content in the nucleon. Author(s): Gonzalez-Jimenez, R.; Caballero, J. A.; Donnelly, T. W. Physics Reports-Review Section of Physics Letters, Volume: 524 Issue: 1. Pages: 1-35. Published: MAR 2013. Times Cited: 34, DOI: [10.1016/j.physrep.2012.10.003](https://doi.org/10.1016/j.physrep.2012.10.003).

10. Title: Neutrino and antineutrino CCQE scattering in the Superscaling Approximation from MiniBooNE to NOMAD energies. Author(s): Megias, G.D.; Amaro, J.E.; Barbaro, M.B.; Caballero, J.A., Donnelly, T.W. Physics Letters B 725, 1-3, (2013). Pages: 170-174. Times cited: 28, DOI: [10.1016/J.PHYSLETB.2013.07.004](https://doi.org/10.1016/J.PHYSLETB.2013.07.004)

C.2. Research projects and grants (2013-present)

1.- Neutrino Oscillation Analysis at T2K and SuperKamiokande experiments: Can neutrinos explain the matter-antimatter asymmetry in the Universe? (NEUTON). Horizon 2020. Individual Global Fellowships (IF-GF). Standard European Fellowships (Acción Marie Curie H2020). 271227,84 EUR. 01/09/2019 – 31/08/2022. Invest. Responsables: T. Kajita (University of Tokyo) and Juan Antonio Caballero (University of Seville).

2.- Procesos de dispersión fuerte, electromagnética y débil con núcleos a energías bajas e intermedias. Ministerio de Ciencia e Innovación. Caballero Carretero, Juan Antonio (University of Seville). 2021-2023. 130000 €. Referencia: PID2020-114687GB-I00.

3. Estudios de procesos de dispersión fuerte y electrodébil con núcleos a energías bajas e intermedias. Ministerio de Economía, Industria y Competitividad. Caballero-Carretero, Juan Antonio (University of Seville). 2018-2020. 90750 EUR. Referencia: FIS2017-88410-P.

4. Estructura de Núcleos, Moléculas y Hadrones y su Dinámica en Procesos de Dispersión Fuerte y Electrodébil. Ministerio de Economía y Competitividad. Caballero-Carretero, Juan Antonio (Univ. de Sevilla). 2015-2017. 72600 EUR. Referencia: FIS2014-53448-C2-1-P.

5. La Física Nuclear Fuera del Valle de Beta-Estabilidad: Sus Implicaciones en Astrofísica. JUNTA DE ANDALUCÍA - CONSEJERÍA DE INNOVACIÓN, CIENCIA Y EMPRESAS. Lozano-Leyva, Manuel Luis (U. of Seville). 2013-2017. 176918,3 EUR.

C.3. Contracts

Professor in charge of the following postdoc/sabbatical periods:

1.- Dra. Chiara Maieron (June, 2002 - March, 2003). Programme: “Estancias de doctores y tecnólogos extranjeros en España”. Ref.: SB2000-0427, project: 2002/1115.

2.- Prof. Maria B. Barbaro (Univ. of Turin): Sept. 2002 – Dec. 2002. Programme: “Estancias de profesores e investigadores extranjeros, de acreditada experiencia, en régimen de año sabático en España”. Ref.: SAB2001-0025, project: 2002/1036.

C.4. Patents

C.5 PhD and Master Theses supervised (last 10 years)

Title: “Violación de paridad en dispersión elástica y cuasielástica de electrones por nucleones y núcleos”. PhD Thesis by Raúl González Jiménez. Defense: 04/04/2014. Mark: Sobresaliente cum laude. International Mention. Extrordinary doctoral prize. Third prize to the best PhD Thesis in Nuclear Physics by Spanish Royal Society of Physics.



Title: "Charged-current neutrino interactions with nucleons and nuclei at intermediate energies". PhD Thesis by Guillermo D. Megías Vázquez. Defense: 20/09/2017. Mark: Sobresaliente cum laude. International Mention. Extraordinary doctoral prize. Award to the best PhD Thesis in Theoretical Nuclear Physics by Spanish Royal Society of Physics.

Title: "Violación de paridad en dispersión elástica de electrones por nucleones". Master Thesis by Raúl González Jiménez. Defense: 30/09/2010. Mark: Sobresaliente.

Title: "Interacción neutrino-núcleo mediada por corrientes cargadas". Master Thesis by Guillermo Daniel Megías Vázquez. Defense: 23/11/2012. Mark: Sobresaliente (MH).

Title: "Estudio del proceso de dispersión electrón-núcleo en la aproximación de impulso". Master Thesis by Alejandro Barba Lobo. Defense: Sept. 2017. Mark: Sobresaliente.

C.6 Science Outreach (2013-present)

Title: "Dirac. La antimateria. El reflejo oscuro de la materia". Book: "Grandes ideas de la Ciencia". RBA editores. Barcelona (2013). ISBN: 978-84-473-7676-6. Available in French, Spanish, Italian, and Russian.

Title: "Pauli. El espín. Los electrones bailan". Book: "Grandes ideas de la Ciencia". RBA editores. Barcelona (2014). ISBN: 978-84-473-7777-0. Available in French, Italian and Spanish.

Title: "Los neutrinos. Las partículas elementales que todo lo atraviesan". Book: "Un paseo por el Cosmos". RBA editores. Barcelona (2015). ISBN: 978-84-473-8307-8. Available in French, Italian and Spanish.

Title: "Los neutrinos. Las partículas elementales que todo lo atraviesan". Conference in the Faculty of Physics (US) 15/12/2015 to celebrate the Nobel Prize in Physics 2015.

C.7 Institutional responsibilities

Director of Scientific Research of the University of Seville: Feb. 2021 to present. Head of the Atomic, Molecular and Nuclear Physics Department (US): June 2017 to Feb. 2021. Academic Secretary of the Faculty of Physics (US): June 2008 – June 2017.

C.8 Participation in National and International Scientific Committees

Referee for several JCR journals: Physical Review C and D (more than 10 times), Physical Review Letters (>5), Review of Modern Physics (1), Physics Letters B (>5), Nuclear Physics A (>5), Physics Reports (1), Journal of Physics G (>3), and Annals of Physics (2-3).

Referee of research projects for the ANEP, Spanish Government, from 2005. Member of the Ramón y Cajal committee (2019). Referee of international research projects for the FWO (Belgium), Bulgarian Academy of Science, INFN-Science Ministry (Italy), and IN2P3 (France).

Member of scientific committee for the international workshop NUINT, last time in 2017 (Toronto).

Director of the "International Scientific Meeting on Nuclear Physics" celebrated in La Rábida in 2009 and 2012. Member of the scientific committee in the years 2015 and 2018.

National Coordinator of the Spanish Nuclear Physics Network (FNUC): period 2012-2014. Coordinator (Seville) of the Interuniversity Institute Carlos I for Theoretical and Computational Physics.



Part A. PERSONAL INFORMATION		CV date	12/09/2023
First and Family name	Juan Antonio Caballero Carretero		
ID number			
Researcher numbers	Researcher ID	K-6609-2014	
	ORCID code	0000-0001-9691-0874	
	Scopus	35556445900	

A.1. Current position

Institution	University of Seville		
Department	Atomic, Molecular and Nuclear Physics		
Address and Country	Seville, Andalusia, Spain		
Phone number	E-mail	jac@us.es	
Current position	Full Professor ("Catedrático")	From	21/11/2007
UNESCO code	220719		
Key words	Electroweak interactions, hadron and nuclear structure, electron and neutrino scattering, parity violation		

A.2. Education

Degree/PhD	University	Year
Degree ("Licenciatura")	University of Extremadura	1985
PhD	Autonomous University of Madrid	1989

A.3. JCR articles, h Index, thesis supervised...

Six-year research ("sexenios de investigación"): 6. Last one: 2016-2021.

Five-year teaching activities ("quinquenios de docencia"): 6

PhD thesis supervised (last 10 years): 2.

Publ. in scientific journals: 146 (WoS), 149 (Scopus), 160 (ORCID).

Total cites: 3543 (WoS), 3702 (Scopus).

H-index: 36 (WoS), 36 (Scopus).

Publications with high impact factor: 2 Physics Reports (25.010 impact factor), 6 Physical Review Letters (7.489) y 12 Physics Letters B (5.043).

Part B. CV SUMMARY (max. 3500 characters, including spaces)

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In the last years, my main research activities have been related to the study of neutrino-nucleus and nucleon interaction. This topic is of great interest; not only does it provide precise information on neutrino oscillations, but it also has important implications in nuclear astrophysics. This is clearly shown through the significant number of international labs and research centers where neutrino-nucleus experiments are carried out. The analysis of data requires the use of theoretical models capable of providing a good, precise enough, description



of the neutrino-nucleus interaction. This means not only to describe the reaction mechanism (or elementary vertex) but also the complex nuclear structure of the target. In this sense, it is essential to include effects beyond the impulse approximation, such as meson exchange currents, two-particle two-hole contributions, correlations, radiative corrections, etc. Also, because of the high energies involved in the experiments, it is mandatory to make use of a fully relativistic description of the process that includes kinematical and dynamical relativistic effects linked to the reaction mechanism/nuclear structure. The validity of the so-called scaling phenomenon has been clearly proved through the analysis of electron-nucleus scattering data. We have performed detailed investigations on this topic and applied it to the case of neutrino reactions. This approach has allowed us to study neutrino scattering processes without relying upon any particular nuclear model. The results, in very good agreement with data, have been presented and discussed in detail in high impact international scientific journals (see list of publications).

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Part C. RELEVANT MERITS

C.1. Publications (10 cited publications [WOS] in the last years)

1. Title: Meson-exchange currents and quasielastic neutrino cross sections in the superscaling approximation model. Author(s): Amaro, J. E.; Barbaro, M. B.; Caballero, J. A.; et al. Physics Letters B, Volume: 696 Issue: 1-2 Pages: 151-155 Published: JAN 24 2011. Times Cited: 106, DOI: 10.1016/j.physletb.2010.12.007.
2. Title: Relativistic analyses of quasielastic neutrino cross sections at MiniBooNE kinematics Author(s): Amaro, J. E.; Barbaro, M. B.; Caballero, J. A.; et al. Physical Review D Volume: 84 Issue: 3 Published: AUG 8 2011. Times Cited: 68, DOI: 10.1103/PhysRevD.84.033004.
3. Title: Meson-Exchange Currents and Quasielastic Antineutrino Cross Sections in the Superscaling Approximation. Author(s): Amaro, J. E.; Barbaro, M. B.; Caballero, J. A.; et al. Physical Review Letters Volume: 108 Issue: 15 Published: APR 12 2012. Times Cited: 62, DOI: 10.1103/PhysRevLett.108.152501.
4. Title: Extensions of superscaling from relativistic mean field theory: The SuSAv2 model. Author(s): Gonzalez-Jimenez, R.; Megias, G. D.; Barbaro, M. B.; et al. Physical Review C Volume: 90 Issue: 3 Published: SEP 15 2014. Times Cited: 65, DOI: 10.1103/PhysRevC.90.035501.
5. Title: Charged-current neutrino-nucleus reactions within the superscaling meson-exchange current approach. Author(s): Megias, G.D.; Barbaro, M.B.; Caballero, J.A.; Donnelly, T.W.; Ruiz-Simo, I. Physical Review D 94, 093004 (2016). Times cited: 52. DOI: [10.1103/PHYSREVD.94.093004](https://doi.org/10.1103/PHYSREVD.94.093004)
6. Title: Relativistic Descriptions of Final-State Interactions in Charged-Current Quasielastic Neutrino-Nucleus Scattering at MiniBooNE Kinematics. Author(s): Meucci, Andrea; Barbaro, M. B.; Caballero, J. A.; et al. Physical Review Letters Volume: 107 Issue: 17 Published: OCT 17 2011. Times Cited: 48, DOI: 10.1103/PhysRevLett.107.172501.
7. Title: Meson-exchange currents and quasielastic predictions for charged-current neutrino-C-12 scattering in the superscaling approach. Author(s): Megias, G. D.; Donnelly, T. W.;



Moreno, O.; et al. Physical Review D Volume: 91 Issue: 7 Published: APR 7 2015. Times Cited: 52, DOI: [10.1103/PhysRevD.91.073004](https://doi.org/10.1103/PhysRevD.91.073004).

8. Title: Inclusive electron scattering within the SuSAv2 meson exchange current approach. Author(s): Megias, G.D.; Amaro, J.E.; Barbaro, M.B; Caballero, J.A.; Donnelly, T.W. Physical Review D 94, 013012 (2016). Times cited: 46, DOI: [10.1103/PHYSREVD.94.013012](https://doi.org/10.1103/PHYSREVD.94.013012)

9. Title: Parity violation in elastic electron-nucleon scattering: Strangeness content in the nucleon. Author(s): Gonzalez-Jimenez, R.; Caballero, J. A.; Donnelly, T. W. Physics Reports-Review Section of Physics Letters, Volume: 524 Issue: 1. Pages: 1-35. Published: MAR 2013. Times Cited: 34, DOI: [10.1016/j.physrep.2012.10.003](https://doi.org/10.1016/j.physrep.2012.10.003).

10. Title: Neutrino and antineutrino CCQE scattering in the Superscaling Approximation from MiniBooNE to NOMAD energies. Author(s): Megias, G.D.; Amaro, J.E.; Barbaro, M.B.; Caballero, J.A., Donnelly, T.W. Physics Letters B 725, 1-3, (2013). Pages: 170-174. Times cited: 28, DOI: [10.1016/J.PHYSLETB.2013.07.004](https://doi.org/10.1016/J.PHYSLETB.2013.07.004)

C.2. Research projects and grants (2013-present)

1.- Neutrino Oscillation Analysis at T2K and SuperKamiokande experiments: Can neutrinos explain the matter-antimatter asymmetry in the Universe? (NEUTON). Horizon 2020. Individual Global Fellowships (IF-GF). Standard European Fellowships (Acción Marie Curie H2020). 271227,84 EUR. 01/09/2019 – 31/08/2022. Invest. Responsables: T. Kajita (University of Tokyo) and Juan Antonio Caballero (University of Seville).

2.- Procesos de dispersión fuerte, electromagnética y débil con núcleos a energías bajas e intermedias. Ministerio de Ciencia e Innovación. Caballero Carretero, Juan Antonio (University of Seville). 2021-2023. 130000 €. Referencia: PID2020-114687GB-I00.

3. Estudios de procesos de dispersión fuerte y electrodébil con núcleos a energías bajas e intermedias. Ministerio de Economía, Industria y Competitividad. Caballero-Carretero, Juan Antonio (University of Seville). 2018-2020. 90750 EUR. Referencia: FIS2017-88410-P.

4. Estructura de Núcleos, Moléculas y Hadrones y su Dinámica en Procesos de Dispersión Fuerte y Electrodébil. Ministerio de Economía y Competitividad. Caballero-Carretero, Juan Antonio (Univ. de Sevilla). 2015-2017. 72600 EUR. Referencia: FIS2014-53448-C2-1-P.

5. La Física Nuclear Fuera del Valle de Beta-Estabilidad: Sus Implicaciones en Astrofísica. JUNTA DE ANDALUCÍA - CONSEJERÍA DE INNOVACIÓN, CIENCIA Y EMPRESAS. Lozano-Leyva, Manuel Luis (U. of Seville). 2013-2017. 176918,3 EUR.

C.3. Contracts

Professor in charge of the following postdoc/sabbatical periods:

1.- Dra. Chiara Maieron (June, 2002 - March, 2003). Programme: “Estancias de doctores y tecnólogos extranjeros en España”. Ref.: SB2000-0427, project: 2002/1115.

2.- Prof. Maria B. Barbaro (Univ. of Turin): Sept. 2002 – Dec. 2002. Programme: “Estancias de profesores e investigadores extranjeros, de acreditada experiencia, en régimen de año sabático en España”. Ref.: SAB2001-0025, project: 2002/1036.

C.4. Patents

C.5 PhD and Master Theses supervised (last 10 years)

Title: “Violación de paridad en dispersión elástica y cuasielástica de electrones por nucleones y núcleos”. PhD Thesis by Raúl González Jiménez. Defense: 04/04/2014. Mark: Sobresaliente cum laude. International Mention. Extrordinary doctoral prize. Third prize to the best PhD Thesis in Nuclear Physics by Spanish Royal Society of Physics.



Title: "Charged-current neutrino interactions with nucleons and nuclei at intermediate energies". PhD Thesis by Guillermo D. Megías Vázquez. Defense: 20/09/2017. Mark: Sobresaliente cum laude. International Mention. Extraordinary doctoral prize. Award to the best PhD Thesis in Theoretical Nuclear Physics by Spanish Royal Society of Physics.

Title: "Violación de paridad en dispersión elástica de electrones por nucleones". Master Thesis by Raúl González Jiménez. Defense: 30/09/2010. Mark: Sobresaliente.

Title: "Interacción neutrino-núcleo mediada por corrientes cargadas". Master Thesis by Guillermo Daniel Megías Vázquez. Defense: 23/11/2012. Mark: Sobresaliente (MH).

Title: "Estudio del proceso de dispersión electrón-núcleo en la aproximación de impulso". Master Thesis by Alejandro Barba Lobo. Defense: Sept. 2017. Mark: Sobresaliente.

C.6 Science Outreach (2013-present)

Title: "Dirac. La antimateria. El reflejo oscuro de la materia". Book: "Grandes ideas de la Ciencia". RBA editores. Barcelona (2013). ISBN: 978-84-473-7676-6. Available in French, Spanish, Italian, and Russian.

Title: "Pauli. El espín. Los electrones bailan". Book: "Grandes ideas de la Ciencia". RBA editores. Barcelona (2014). ISBN: 978-84-473-7777-0. Available in French, Italian and Spanish.

Title: "Los neutrinos. Las partículas elementales que todo lo atraviesan". Book: "Un paseo por el Cosmos". RBA editores. Barcelona (2015). ISBN: 978-84-473-8307-8. Available in French, Italian and Spanish.

Title: "Los neutrinos. Las partículas elementales que todo lo atraviesan". Conference in the Faculty of Physics (US) 15/12/2015 to celebrate the Nobel Prize in Physics 2015.

C.7 Institutional responsibilities

Director of Scientific Research of the University of Seville: Feb. 2021 to present. Head of the Atomic, Molecular and Nuclear Physics Department (US): June 2017 to Feb. 2021. Academic Secretary of the Faculty of Physics (US): June 2008 – June 2017.

C.8 Participation in National and International Scientific Committees

Referee for several JCR journals: Physical Review C and D (more than 10 times), Physical Review Letters (>5), Review of Modern Physics (1), Physics Letters B (>5), Nuclear Physics A (>5), Physics Reports (1), Journal of Physics G (>3), and Annals of Physics (2-3).

Referee of research projects for the ANEP, Spanish Government, from 2005. Member of the Ramón y Cajal committee (2019). Referee of international research projects for the FWO (Belgium), Bulgarian Academy of Science, INFN-Science Ministry (Italy), and IN2P3 (France).

Member of scientific committee for the international workshop NUINT, last time in 2017 (Toronto).

Director of the "International Scientific Meeting on Nuclear Physics" celebrated in La Rábida in 2009 and 2012. Member of the scientific committee in the years 2015 and 2018.

National Coordinator of the Spanish Nuclear Physics Network (FNUC): period 2012-2014. Coordinator (Seville) of the Interuniversity Institute Carlos I for Theoretical and Computational Physics.

Part A. PERSONAL INFORMATION

CV date August 20, 2024

First name	Juan Miguel		
Family name	Nieves Pamplona		
Researcher codes	ORCID	0000-0002-2518-4606	
	SCOPUS Author ID	15846146700	
	WoS Researcher ID	K-2115-2014	

A.1. Current position

Position	Investigador Científico (Senior Researcher)		
Initial date	May 19, 2008		
Institution	Spanish Research Council (CSIC)		
Department/Center	Theory	Instituto de Física Corpuscular (IFIC)	
Country	Spain	Phone number	
Key words	Low energy QCD, non-perturbative methods for hadron physics, neutrino-nucleus cross sections and neutrino oscillations, chiral and heavy-quark effective theories, exotics: tetra and pentaquarks, etc.		

A.2. Previous positions (research activity)

Period	Position/Institution/Country
27/11/1995-18/05/2008 (150 months)	Prof. Titular (Lecturer) at Univ. Granada (Spain).
07/07/2006-24/09/2006 (3 months)	Visiting Prof. at Univ. Southampton (U. K.)
26/06/1995-26/11/1995 (3 months)	Research fellow (postdoc) at Univ. Valencia (Spain)
01/04/1993-25/06/1995 (27 months)	Research fellow (postdoc) at Univ. Southampton (U. K.)
01/01/1989-31/12/1992 (48 months)	PhD fellow (FPU) at Univ. Valencia (Spain)

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
Licensed in Theoretical Physics (excellence award)	University of Valencia (Spain)	1988
PhD in Theoretical Physics (excellence award)	University of Valencia (Spain)	1992

Part B. CV SUMMARY

Scopus: 10400 citations (average 670 citations/year in 2019-23) and index $h=58$. Around 175 [200] papers within the first quarter Q1 [Q1+Q2] of JCR impact index, without proceedings, and around 80 talks given at international conferences. In iNSPIRE (High Energy Physics) 13.825 citations and $h=65$.

FIVE "research *sexenios*", DIRECTOR of TEN PhD theses and another ONE in progress. Positively evaluated (ANECA) for Full Professor (CU) since 2008. Large teaching experience in Degree, Master and PhD courses. HEAD of IFIC Theory Department (2013-17) and DIRECTOR of the IFIC CSIC group "*EFTs in hadron and nuclear physics*" since 2019. PI of SIX projects of the Spanish National Plan (2003-05, 2006-08, 2012-15, 2015-17, 2018-21 and 2021-), of ONE excellence project of the Valencian Generalitat (2020-23), and Work-Package co-spokesperson of an EU H2020-INFRAIA-2018 project (2019-24).

Member of the *Theory Advisory Group of PANDA detector at FAIR* since 2013 and of a review committee (2021) for the *Inner Tracker of the SAND detector at DUNE* in Fermilab (USA). Referee for several Research Evaluation Agencies --ANEP (Spain), AGAUR (Catalunya), ACSUCYL (Castilla y León), DEVA-AAC (Andalucía), DFG (Germany), Israel Science Foundation, Croatian Science Foundation, FONDECYT-CONICYT (Chile), ANPCyT (Argentina) and The Research Foundation--Flanders (Belgium)--, and for several journals (Nucl. Phys. A and B, Phys. Lett. B, Phys. Rev. C and D, Phys. Rev. Lett., Eur. Phys. Jour. A and C, etc.) Outstanding Referee of the Physical Review journals in 2023 and one of the

most valued reviewers of Nuclear Physics A in 2014. Member of the panel of experts for the RyC, JdC, Spain-UK bilateral actions, Spanish National Plan of Physics projects and of 28 PhD thesis committees.

ORGANIZATION of 10 International Conferences, one Summer School and CONVENER of the workshop-series NuFacT (2009, 2010 and 2011), Nulnt (2012 and 2015) and HADRON (2017 and 2023).

Research: Quantum Chromodynamics (QCD) is adequate to study strong-force processes that involve energy-moment transfers much greater than the confinement scale. In this regime, the interactions between quarks and gluons are weak and it is possible to use perturbative techniques. My research, however, focuses on the study of processes at low energies, where perturbative QCD techniques cannot be used. A first objective is to understand how quarks and gluons conspire to produce the great diversity of low energy hadronic processes. The second objective is to describe the interactions between hadrons inside of a nuclear medium. Both objectives are complementary. Even if QCD were resolved exactly in the vacuum, it would still be necessary to understand how hadronic processes are modified in a (hot) nuclear environment. On the other hand, although using phenomenological models in the free space, one would find a satisfactory description of reactions involving nuclei, it would still be necessary to describe these phenomenological interactions in terms of QCD.

In this context, I have studied properties of different heavy hadrons, including exotic states recently reported by LHCb (CERN), Belle (Japan), BES (China)..., using Monte Carlo lattice QCD, constituent quark models and effective unitary theories based on heavy-quark flavor and spin symmetries. I have also worked with unitary extensions of ChPT and studied the limit of large number of colors.

On the other hand, I have also studied the pion-nucleus interaction from threshold to the $\Delta(1232)$ resonance and the inclusive and exclusive nuclear responses to photon, electron and neutrino probes. I have paid special attention to reactions of interest for neutrino-oscillation experiments (K2K/T2K in Japan or MiniBooNE, MINERVA and DUNE in USA). Our works are a world reference and the “*Valencia model*” is included in most of the event generators used in the experimental analysis

Part C. RELEVANT MERITS (*sorted by typology*)

C.1. Publications (10 selected works) [Scopus / iNSPIRE HEP citations]. I have written articles with more than 200 researchers from different international institutions.

1. Bethe-Salpeter approach for unitarized chiral perturbation theory, Nieves, J.; Ruiz-Arriola, E.; NUCLEAR PHYSICS A 679 (2000) pages: 57-117 [**187 / 235 citations**].
DOI: [10.1016/S0375-9474\(00\)00321-3](https://doi.org/10.1016/S0375-9474(00)00321-3)
2. $S = -1$ meson-baryon unitarized coupled channel chiral perturbation theory and the S_{01} resonances $\Lambda(1405)$ and $\Lambda(1670)$, García-Recio, C.; Nieves, J.; Ruiz-Arriola, E.; Vicente-Vacas, M. J.; PHYSICAL REVIEW D 67 (2003) 076009-14 pags. [**198 / 249 citations**].
DOI: [10.1103/PhysRevD.67.076009](https://doi.org/10.1103/PhysRevD.67.076009)
3. Inclusive quasielastic charged-current neutrino-nucleus reactions, Nieves, J.; Amaro, J.E.; Valverde, M.; PHYSICAL REVIEW C 70 (2004) 055503-23 pags. [**225 / 371 citations**].
DOI: [10.1103/PhysRevC.70.055503](https://doi.org/10.1103/PhysRevC.70.055503)
4. Quark mass dependence of s-wave baryon resonances, García-Recio, C.; Lutz, M.F.M; Nieves, J.; PHYSICS LETTERS B 582 (2004) pages: 49-54 [**192 / 242 citations**].
DOI: [10.1016/j.physletb.2003.11.073](https://doi.org/10.1016/j.physletb.2003.11.073)
5. Weak pion production off the nucleon, Hernández, E.; Nieves, J.; Valverde, M.; PHYSICAL REVIEW D 76 (2007) 033005-22 pags. [**195 / 261 citations**]. DOI: [10.1103/PhysRevD.76.033005](https://doi.org/10.1103/PhysRevD.76.033005)

6. Couplings in coupled channels versus wave functions: Application to the $X(3872)$ resonance, Gamermann, D.; Nieves, J.; Oset, E.; Ruiz-Arriola, E.; PHYSICAL REVIEW D81 (2010) 014029-14 pags. [266 / 310 citations]. DOI: [10.1103/PhysRevD.81.014029](https://doi.org/10.1103/PhysRevD.81.014029)
7. Inclusive charged-current neutrino-nucleus reactions, Nieves, J.; Ruiz-Simo, I.; Vicente-Vacas, M. J.; PHYSICAL REVIEW C83 (2011) 045501-19 pags. [312 / 461 citations]. DOI: [10.1103/PhysRevC.83.045501](https://doi.org/10.1103/PhysRevC.83.045501)
8. The nucleon axial mass and the MiniBooNE quasielastic neutrino-nucleus scattering problem, Nieves, J.; Ruiz-Simo, I.; Vicente-Vacas, M. J.; PHYSICS LETTERS B707 (2012) pages: 72-75. [196 / 295 citations]. DOI: [10.1016/j.physletb.2011.11.061](https://doi.org/10.1016/j.physletb.2011.11.061)
9. Consequences of heavy-quark symmetries for hadronic molecules, Guo, F.-K.; Hidalgo-Duque, C.; Nieves, J.; Valderrama-Pavón, M.; PHYSICAL REVIEW D88 (2013) 054007 -5 pages. [225 / 286 citations]. DOI: [10.1103/PhysRevD.88.054007](https://doi.org/10.1103/PhysRevD.88.054007)
10. LHCb pentaquark as a $\bar{D}^* \Sigma_c - \bar{D}^* \Sigma_c^*$ molecular state, Roca, L.; Nieves, J.; Oset, E.; PHYSICAL REVIEW D92 (2015) 094003-6 pages. [193 / 249 citations]. DOI: [10.1103/PhysRevD.92.094003](https://doi.org/10.1103/PhysRevD.92.094003)

C.2. Talks/Conferences: I have given around 85 oral presentations at International Conferences and my collaborators, including PhD students, have given another 200. I have been also Lecturer at several International Schools: La Rábida (Spain), Fermilab (USA), Ladek Zdròj (Poland), Prague (Czech Republic), etc. I select below some invited talks from among the last ones that I have given personally.

1. *2p2h excitations, MEC, nucleon correlations and other sources of QE-like events*, 'NuInt15, 10th International Workshop on Neutrino-Nucleus Interaction in the Few GeV Region', Osaka (Japan), November 2015.
2. *Theoretical challenges in neutrino scattering studies*, 'Neutrino 2016: XXVII International Conference on Neutrino Physics and Astrophysics', London (UK), July 2016.
3. *QE-like scattering and neutrino energy reconstruction*, 'NOW 2016, 9th Neutrino Oscillation Workshop', Otranto (Italy), September 2016.
4. *Nuclear Effects in Pion Production in the resonance region*, 'NuInt17, 11th International Workshop on Neutrino-Nucleus Interaction in the Few GeV Region', Toronto, June 2017
5. *Theory developments in neutrino cross sections*, 'NuPhys2017: Prospects in Neutrino Physics', London (UK), December 2017
6. *Neutrino cross sections vs systematics*, 'Neutrino Platform Week', CERN, January 2018
7. *Theoretical interpretation of some even parity Quarkonium XYZ states, open heavy flavor mesons and odd parity doubly charmed baryons*, 'Workshop on the Physics of HL-LHC and perspectives at HE-LHC', CERN (Switzerland), June 2018
8. *Theoretical review of heavy-light spectroscopy*, '18th International Conference on Hadron Spectroscopy and Structure (HADRON2019)', Guilin (China), August 2019
9. *Inclusive νA cross sections at intermediate energies: Valencia model*, 'Neutrino Nucleus Interactions in the SM and beyond', CERN (Switzerland), January 2022 (remotely).
10. *Nature of the lowest-lying odd parity bottomed and charmed baryon resonances*, '3rd Workshop J-PARC HEF-ex', J-PARC (Japan), March 2023 (remotely)
11. *Lowest-lying odd parity bottom, charm and strange baryon resonances*, 'The Present and Future of Heavy Flavour and Exotic Hadron Spectroscopy', MIAPbP (Munich), May 2023
12. *Heavy baryons and heavy quark symmetry*, '20th International Conference on Hadron Spectroscopy and Structure (HADRON 2023)', Genova (Italy), June 2023

13. *QE mechanism within Valencia model*, 'Workshop on Neutrino Scattering at Low and Intermediate Energies', MITP, Mainz (Germany), July 2023
14. *Light-and heavy-quark hadron spectroscopy*, 'Exotic multi-quark states and baryon spectroscopy workshop', University of Bonn (Germany), June 2024.
15. *The $\chi_{c1}(3872)$, $T_{cc}(3875)$ and $D_{s0}^*(2317)$ in nuclear matter*, 'The 10th International Conference on Quarks and Nuclear Physics (QNP2024)', Barcelona (Spain), July 2024.

C.3. Research projects (*selection of projects for which I am/was principal researcher*)

Title: Dynamics of hadron systems in nuclear physics at intermediate energies
 Funding Agency: Spanish Research Agency, BFM2002-03218 and FIS2005-00810
 Periods: October 2002 – December 2005 and October 2005 – May 2008
 Principal Researcher: J. Nieves.

Title: Effective theories in hadron and nuclear physics.
 Funding Agency: Spanish Research Agency, FIS2011-28853-C02-02
 Period: January 2012 – December 2015
 Principal Researcher: J. Nieves.

Title: Effective theories in hadron and nuclear physics.
 Funding Agency: Spanish Research Agency and FEDER funds, FIS2014-51948-C2-1-P and FIS2017-84038-C2-1-P
 Periods: January 2015 - June 2018 and January 2018 - September 2021
 Principal Researcher: J. Nieves (Co-PI: L. Alvarez-Ruso)

Title: Light-and heavy-quark hadron spectroscopy
 Funding Agency: EU H2020-INFRAIA-2018-1. Work Package 25 of project STRONG-2020, proposal number 824093, and coordinator of STRONG-2020: B. Erazmus (CNRS)
 Period: June 2019 - Julio 2024
 Principal Researchers: J. Nieves & M. Battaglieri (INFN).

Title: Effective field theories in hadron and nuclear physics.
 Funding Agency: Generalitat Valenciana, PROMETEO/2020/023 and CIPROM/2023/59 (excellence groups)
 Period: January 2020 – December 2023 and September 2024-August 2028
 Principal Researcher: First project: J. Nieves. Second project: R. Molina (Co-PI: J. Nieves)

Title: Nuclear and hadron physics at intermediate energies
 Funding Agency: Spanish Research Agency, PID2020-112777GB-I00
 Period: September 2021 - August 2025
 Principal Researcher: J. Nieves (Co-PI: L. Alvarez-Ruso)

C.4. Participation in technology/knowledge transfer activities and exploitation of results



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INVESTIGACIÓN

Part A. PERSONAL INFORMATION

CV date

12/06/2024

First name	Luis Miguel		
Family name	Robledo Martin		
Gender (*)		Birth date (dd/mm/yyyy)	
Social Security, Passport, ID number	XXXXXXXX		
e-mail	luis.robledo@uam.es	URL	http://gamma.ft.uam.es/robledo
Open Researcher and Contributor ID (ORCID) (*)	0000-0002-6061-1319		

(*) Mandatory

A.1. Current position

Position	Full Professor		
Initial date	6th October 2020 (BOE)		
Institution	Universidad Autónoma de Madrid		
Department/Center	Theoretical Physics	Science Faculty	
Country	Spain	Phone number	+34914975566
Key words	Nuclear structure (theory), Quantum information		

A.2. Previous positions (research activity interruptions, art. 14.2.b))

Period	Position/Institution/Country/Interruption cause
1984-1988	Ph D Grant / UAM / Spain
1988-1989	PostDoctoral Grant / Lawrence Berkeley Lab / USA
1989-1991	Talent attraction Fellowship / UAM / Spain
1991-1996	Associate Professor (Not permanent) / UAM / Spain
1996-2020	Associate Professor (Faculty) / UAM / Spain
2020-	Full Professor / UAM / Spain

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
Physics Degree	Universidad Autonoma de Madrid	1982
Ph D in Physics	Universidad Autonoma de Madrid	1988

Part B. CV SUMMARY (max. 5000 characters, including spaces)

Along my scientific career I have mostly worked in different aspects of theoretical nuclear structure with phenomenological effective interactions. In the last few years quantum information aspects of the solution of the many-body problem have attracted my interest. This is a purely academic work and therefore the impact on society is merely to extend the frontiers of knowledge.

I have developed computer codes to do mean field calculations with the finite range Gogny force. Several physics cases have been addressed: I) Existence of octupole deformation and its consequences in observables II) Quadrupole-Octupole coupling III) High spin physics in the cranking HFB approximation III) Properties of super-deformed states and fission isomers IV) Characterization of spontaneous fission observables V) Cluster emission described from the very asymmetric fission perspective VI) Quadrupole-Hexadecapole coupling VII) High-K isomers and their decay out.

Restoration of the broken symmetries by the nuclear mean field is important for a more detailed description of nuclear structure properties like transition strengths and the associated selection rules. I pioneered the use of symmetry restoration with effective forces



by considering parity symmetry restoration in my thesis work, later I have implemented particle number and angular momentum restoration. A couple of difficulties were spotted in the implementation of symmetry restoration, they are associated to the violation of the Pauli exclusion principle and the need for a consistent prescription for the density dependent part of effective interactions. The first problem is well under control but the second is still subject of a heated debate. For the latter, I have made important contributions limiting the possible forms of this term. The next step in the hierarchy of many body methods is the consideration of configuration mixing of collective configurations, implemented in the form of the generator coordinate method. I also pioneered the use of the GCM with the Gogny force and applied this technique to a plethora of physics cases.

Previous formulas for the evaluation of overlaps between HFB states were not providing the sign of the overlap. This is an important impediment as the norm is subsequently integrated and therefore relative signs are important. Using techniques of fermion coherent states I developed a new expression for the overlaps in terms of pfaffians that gives the sign without ambiguities. The method can be easily extended to finite temperature. Inspired by the pfaffian I developed another formula to compute arbitrary overlaps of multi-quasiparticle excitations of HFB states that avoid the “combinatorial explosion” problem associated to the factorial large number of terms to be considered in the traditional approaches.

I generalized Wick’s theorem for overlaps to the common case where each of the HFB wave functions are expanded in different bases of the Hilbert space. The impact of taking into account this issue is relevant in many different situations including symmetry restoration.

I have also considered odd mass nuclei and multi-quasiparticle excitations, which require of “blocking” at the HFB level and full consideration of time-odd fields. This implementation requires the introduction of an orthogonality constraint to be able to reach many excited configurations. This framework allows for a consistent calculation of nuclear properties as required by dark matter search experiments and others aiming at physics beyond the standard model.

I have demonstrated how a commonly used phenomenological approach to describe odd mass nuclei (the equal filling approximation) can be justified in terms of a quantum statistical ensemble with a prescribed set of probabilities.

I have participated in the development of the BCPM, BCPMeff, SEI and D1M* functionals. The BCPM functional has recently being used to compute fission properties of over three thousand super-heavy neutron rich nuclei required for astrophysics simulations of nucleosynthesis in the two neutron star merger environment.

According to **Scopus (Google Scholar)** as of June 12th 2024 I have published **224 (252) papers** in scientific journals which have received **7600 (10400) citations** with an average of almost 600 (700) citations per year during the last 5 years. For those publications the corresponding **H index is 53 (62)**. I have published three review papers, one in Reports in Progress in Physics in 2016 and two in Journal of Physics G. One of my publications was featured in “Physics” section of the APS and another one is Editor’s choice of PRC.

I have supervised **Six** Ph D thesis and **six** Master thesis. At present I am supervising two Ph D students.

I have been awarded **six “Sexenios de Investigacion”** by the Spanish agency ANECA.

I have been member of the **editorial board of Physical Review C** in the period 2019-2021.

I have been awarded the **Outstanding Referee of the APS** mention in 2019.

I regularly act as a **referee** of the following journals: Nature Communications, Physical Review Letters, Physical Review C, Nuclear Physics A, Physics Letters B, Journal of Physics G, European Physics Journal A, Physica Scripta, International Journal of Modern Physics E, Acta Physica Polonica, etc

Part C. RELEVANT MERITS (sorted by typology)

C.1. Publications

Ten most relevant publications in the last ten years

- 1) *Formulation of the generator coordinate method with arbitrary bases*
L.M. Robledo
Phys Rev. C **105**, L021307 (2022) (6 pages)
- 2) *Correlation energy and quantum correlations in a solvable model*
J. Faba, V. Martin, L.M. Robledo
Phys Rev. A **104**, 032428 (2022) (8 pages)
- 3) *Symmetry restoration in mean field approaches*
J.A. Sheikh, J. Dobaczewski, P. Ring, L.M. Robledo and C. Yannouleas
J. Phys G. **48**, 123001 (2021) (110 pages)
- 4) *Mean field and beyond description of nuclear structure with the Gogny force: A review*
L.M. Robledo, T. Rodriguez, R. Rodriguez-Guzman
J. Phys G **46**, 013001 (2019) (125 pages)
- 5) *Direct Evidence for Octupole Deformation in 146Ba: Strong E3 and Weak E1 Moments.*
B. Bucher, S. Zhu, C.Y. Wu, R.V.F. Janssens, R.N. Bernard, L.M. Robledo, et al.
Phys. Rev. Lett **118**, 152504 (2017) (6 pages)
- 6) *Nuclear Matrix Elements for Tests of Lorentz Invariance Violation.*
B. A. Brown, G. F. Bertsch, L. M. Robledo, M. V. Romalis and V. Zelevinsky.
Phys. Rev. Lett **119**, 192504 (2017) (6 pages).
- 7) *Octupole correlations in the nucleus 144Ba described with symmetry conserving configuration mixing calculations.*
R.N. Bernard, L.M. Robledo and T.R. Rodriguez.
Phys. Rev. C **93**, 061302 (Rap) (2016) (5 pages)
- 8) *Microscopic theory of nuclear fission: A Review.*
N. Schunck and L.M. Robledo,
Reports on Progress in Physics **79**, 116301 (2016) (58 pages)
- 9) *Dynamic versus static fission paths with realistic interactions.*
S.A. Giuliani, L.M. Robledo and R. Rodriguez-Guzman.
Physical Review **C90**, 054311 (2014) (5 pages)
- 10) *New Kohn-Sham density functional based on microscopic nuclear and neutron matter equations of state.*
M. Baldo, L.M. Robledo, P. Schuck, and X. Viñas;
Physical Review C **87** 064305 (2013) (23 pages)

C.2. Congress

Ten most relevant talks in the last ten years

Microscopic consistent description of octupole correlations all over the nuclear chart



INPC 2019, *Glasgow, August 1st, 2019*

Collective inertias in fission
CUSTIPEN 2018, *Beijing, China 17th September 2018*

Pfaffians in nuclear structure theory
ECT* workshop: Unraveling the complexity of nuclear systems
Trento (Italy) 6-11 February 2017

Octupole correlations in a full-symmetry restoring framework
Nuclear Structure 2016
Knoxville, TN 24/7/2016 - 29/7/2016

Mean field studies of odd mass nuclei with the Gogny force
Nuclear Structure and Dynamics III
Portoroz, Slovenia 14-19 June 2015

Pfaffians in nuclear structure theory
Computational challenges in Nuclear and Many-body Physics
Stockholm, Sweden 16 September 2014

Clustering in atomic nuclei: a mean field perspective
SOTANCP 14
Yokohama, Japan 26 Mayo 2014

Uncertainties in the evaluation of fission observables
INT 13-03 Program on Fission and large amplitude dynamics
Seattle, Washington USA ((2013)) 30 September

Octupole correlations from a theoretical perspective
INPC13, Florence (Italy) (2013) June 7th

C.3. Research projects

Consolider Project 'Multimessenger Approach for Dark Matter Detection (MultiDark)', CSD2009-00064, 2010-14 (extended until June 2017), 3,800,000 € (including 600,000 € as co-financing UAM). PI: Carlos Muñoz Lopez. Acted as a researcher

QUITEMAD: QUantum Information Technologies MADrid,CAM, P2009/ESP-1594, 2010-2013, 1,100,000 €. PI: Miguel Angel Martin Delgado UCM, Acted as a researcher

QUITEMAD+: QUantum Information Technologies MADrid +, CAM, S2013/ICE-2801 2014-2018, 700,000 €. PI: Miguel Angel Martin Delgado UCM, Acted as a researcher

National Project 'Más allá de campo medio y soluciones exactas en sistemas cuánticos de muchos cuerpos', FIS2015-63770, 2015-2018, 65.219 €, PI: Jorge Dukelsky Bercovich at CSIC. Acted as a researcher.

National Project 'Particles and AstroParticles in the Universe', FPA2015-65929-P, 2016-18, 106,722 €. PI: Carlos Muñoz UAM. Acted as a researcher.

National Project 'Microscopic theories for nuclear structure and applications' PGC2018-094583-B-I00, 2019-2021, 96000 €. Acted as PI

National Project 'New developments on the nuclear many body problem' PID2021-127890NB-I00, 117370 €. Acted as PI

C.4. Contracts, technological or transfer merits

Does not apply

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	Marta		
Family name	Anguiano Millán		
Gender (*)		Birth date (dd/mm/yyyy)	
ID number			
e-mail	mangui@ugr.es	URL Web	
Open Researcher and Contributor ID (ORCID) (*)		0000-0003-0238-4434	

(*) Mandatory

A.1. Current position

Position	Catedrática de Universidad (Full Professor)		
Initial date	28/12/2021		
Institution	University of Granada (Granada, Spain)		
Department/Center	Dpto. Atomic, Molecular and Nuclear Physics		
Country	Spain	Teleph. number	+34958240029
Key words	Nuclear structure, Monte Carlo simulations, Medical Physics applications		

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

Period	Position/Institution/Country/Interruption cause
2007-2009	Profesora contratada doctora
2009-2021	Profesora Titular de Universidad

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
Bsc/MSc degree en Physics (Theoretical Physics)	University of Granada (UGR), Spain	1995
PhD in Physics	Autonomous University of Madrid (UAM), Spain	2000

Part B. CV SUMMARY (max. 5000 characters, including spaces)

I graduated in Physics from the University of Granada. After that, I moved in 1996 to the Department of Theoretical Physics in the **Universidad Autónoma de Madrid** to do the **PhD** in the group of Prof. L. Egido. I began to work in topics related to nuclear structure, in particular in models beyond mean-field including restoration of symmetries to study superdeformed nuclei using effective interactions of finite range and density dependent. In particular, my PhD was about particle number restoration in the HFB model using Gogny forces. The main paper regarding this research have more than 160 cites from 2001 (SCOPUS). After finished my PhD, I moved to the Department of Physics in the **University of Lecce (Italy)** to work with the group of Prof. Giampaolo Co'. In that time, I worked in topics related to nuclear structure and scattering of electro-weak probes with nuclei. In 2004, after a brief incursion in the Medical Physics field thanks to a research position in **the Instituto de Física Aplicada (CSIC, Madrid)** from February 2003 to August 2004, I moved to Granada with a five years position, getting in 2009 a permanent one (as associate profesor). Since 2004 my research work is mainly related with two main topics: **theoretical nuclear physics and medical physics**. In the first one, I collaborate mainly with Dr. A.M. Lallena (UGR), Prof. Co' (Univ. Salento, Italy), M. Grasso (IN2P3, France), R. Bernard and N. Pillet (CEA, France), L. Robledo (UAM) and X. Viñas (UB). In the last few years we have been involved in developing a



calculation scheme **Hartree-Fock plus RPA using a general effective nucleon-nucleon interaction of finite range type and including tensor terms**. Calculations of nuclear excited states have been carried out by our group in a fully self-consistent manner and the effect of tensor contributions on these excited states has been studied. We have extended the model to include the treatment of the continuum (CRPA). Finally, we have considered pairing effects in a Hartree-Fock plus BCS scheme using the same interaction and some parametrizations for the tensor term have been proposed. In medical physics I have been involved in some problems related to the use of **Monte Carlo simulation techniques** to the study of transport of radiation in matter and I have supervised a thesis in the field of X-ray dosimetry. In general, the problems that we have analyzed have to do with **the application of Monte Carlo techniques to specific situations of clinical interest**. Together with the Prof. A. M. Lallena, we have collaborated with the Departamento de Electrónica of the University of Granada: Dr. M.A. Carvajal and A. Palma to develop a new MOSFET based dosimetry system. We collaborate with some radio-physicists working at various hospitals in Granada and Málaga and other researchers at University of Málaga (W. González), University of Barcelona (F. Salvat) and University of Essen (L. Brualla). In 2018 spent three months in the group of Dr. Paganetti in the MGH (Boston, USA), expert in the field of protontherapy, thanks to a Fulbright grant. In part, as a result of this stay, our group have began a research line focused in some aspects related with protontherapy. Actually I am supervising three PhDs. In parallel, I do not forget my commitment to society, participating yearly since 2009 in outreach activities such as **Science Week**, the **European Researchers' Night (H2020)**, **Summer Camp Research**, and **Day of the Women and Girl in Science** to promote women's participation in STEM studies.

My global research career can be summarized with the following figures, which show my scientific productivity:

- **78 JCR articles, 60 in Q1**, with number of **citations**: 1923 and **h-index**: 18 (Scopus).
- **60 contributions to Conferences/Workshops contributions**.
- **IP** of 5 national projects and 3 regional ones.
- **1 supervised PhD, 15 Master's Thesis and 5 PhDs in progress**.
- **4 Research 6-year periods**, last 2015/20.
- Evaluator in the Agencia Nacional de Evaluación y Prospectiva para Proyectos de Investigación since 2014.
- Membership of the Technical Commission (Physics Area, FYA) in the Call of I+D+i projects 2020 (Ministerio de Ciencia e Innovación).

Part C. RELEVANT MERITS (sorted by typology)

C.1. Publications (see instructions)

1. I. Álvarez, **M. Anguiano**, F. Mota, R. Hernández and Y. Qiu, **Neutronic assessment of the IFMIF-DONES HFTM specimen stack distribution**. Fusion Engineering and Design 200 (2024) 114212.
2. J.A. de la Torre, A.M. Plaza, A.M. Lallena, F. Salvat and **M. Anguiano**, **Multiple scattering calculations for proton beams: Comparison of results from the general purpose Monte Carlo codes PENH, FLUKA y TOPAS**. Rad. Phys. Chem. 213 (2023) 111225.
3. G. Co', **M. Anguiano** and A.M. Lallena, **Charge radii of Ca isotopes and correlations**. Phys. Rev. C105 (2022) 034320.
4. L.I. Ramos García, J. F. Pérez-Azorín, **M. Anguiano** and A.M. Lallena, **Monte Carlo calculation of charge collection efficiencies in ionization chambers**. Phys. Med. Biol. 66 (2021) 045011.
5. G. Co', **M. Anguiano**, A.M. Lallena, **Nuclear structure uncertainties in coherent elastic neutrino-nucleus scattering**. Journal of Cosmology and Astroparticle Physics 04 (2020)044, pp. 1-26
6. R.N. Bernard and **M. Anguiano**, **Interplay between tensor force and deformation in even-even nuclei**. Nucl. Phys. A953 (2016), 32.



7. **M. Anguiano**, R.N. Bernard, A.M. Lallena, G. Co' and V. De Donno, **Interplay between pairing and tensor effects in the N=82 even-even isotone chain**. *Nuc. Phys. A*955 (2016), 181.
8. W. González, I.-B. García, **M. Anguiano** and A.M. Lallena, 2015, **A general photon source model for clinical linac heads in photon mode**. *Radiat. Phys. Chem.* 117, 140.
9. **M. Anguiano**, A.M. Lallena, G. Co' and V. De Donno, **A study of self-consistent Hartree-Fock plus Bardeen-Cooper-Schrieffer calculations with finite-range interactions**. *J. Phys. G: Nucl. Part. Phys.* 41 (2014), 025102.
10. U. Chica, **M. Anguiano** and A.M. Lallena, **On the behaviour of f_{cQ} factors with quality indexes for medium energy x-ray beams: A Monte Carlo study with PENELOPE**. *Radiat. Phys. Chem.* 90 (2013) 73.
11. M. Carvajal, S. García-Pareja, D. Guirado, M. Vilches, **M. Anguiano**, A.J. Palma and A.M. Lallena, **Monte Carlo simulation using the PENELOPE code with an ant colony algorithm to study MOSFET detectors**, *Phys. Med. Biol.* 54 (2009) 6263-6276.
12. M. Vilches, S. García-Pareja, R. Guerrero, **M. Anguiano** and A.M. Lallena, **Monte Carlo simulation of the electro transport through air slabs: A comparative study of PENELOPE, GEANT3, GEANT4 and EGSnrc Monte Carlo codes**, *IEEE Trans. Nucl. Sci.* 55 (2008) 710-716.
13. **M. Anguiano**, J.L. Egido and L.M. Robledo, **Particle number projection with effective forces**, *Nucl. Phys. A* 696 (2001) 467-493.

C.2. Congress, indicating the modality of their participation (invited conference, oral presentation, poster)

1. W. González, D. Puerta-Megías, **M. Anguiano** and A.M. Lallena, **Relative biological effectiveness in the spatial fractionation of hadron therapy beams**. Conference: International Conference on Monte Carlo Techniques for Medical Applications. Antwerp (Belgium), April 2022. **Oral**.
2. **M. Anguiano**, G. Co', V. De Donno and A.M. Lallena. **Mirror nuclei in the mass region $A=20-50$: effect of tensor interaction and pairing**. Conference: Recent advances on proton-neutron pairing and quasiparticle correlations in nuclei. ESNT Saclay, Paris (France). September 2019. **Oral**.
3. **M. Anguiano**, V. De Donno, G. Co', A.M. Lallena, M. Grasso and R.N. Bernard. **Tensor force in Gogny interactions**. Conference: Landau Fermi liquid theory and many body systems. ECT* Trento (Italy). May 2019. **Oral**.
4. G. Co', V. De Donno, A.M. Lallena, M. Grasso, R.N. Bernard and **M. Anguiano**. **Gogny interactions with tensor terms**. Conference: First Gogny Conference. Bruyères-le-Châtel, Paris (France). December 2015. **Invited conference**.
5. W. González, A.M. Lallena and **M. Anguiano**. **A general source model for clinical linac heads in photon model**. Conference: World Congress on Medical Physics and Biomedical Engineering. Toronto (Canada). June 2015. **Oral**.
6. M. Vilches, S. García-Pareja, R. Guerrero, **M. Anguiano** and A.M. Lallena. **Effect of the electron transport through thin slabs on the dosimetry of linear electron accelerators of use in radiotherapy: a comparative study of various Monte Carlo codes**. Conference: XIII UK Monte Carlo User Group Meeting (MCNEG 2007). Teddington (UK). March 2007. **Oral**.
7. **M. Anguiano**, G. Co' and A.M. Lallena, **Two-proton emission with electromagnetic probes**. Conference: VI Workshop on electromagnetic induced two-hadrons emission. Pavia (Italy). September 2003. **Oral**.

C.3. Research projects, indicating your personal contribution. In the case of young researchers, indicate lines of research for which they have been responsible.

1. **Reference:** PID2022-137543NB-I00. Title: *Physical dosimetry of particles and nuclear structure*. Funding institution: Ministerio de Ciencia e Innovación. Call: Plan Nacional I+D+i 2022. Principal investigator: Dra. **Marta Anguiano Millán (IP1)** y Dr. Miguel Ángel Carvajal Rodríguez (IP2). Affiliation: Universidad de Granada. From: 01/09/2023 to 31/08/2026. Total quantity: 122500,00 €

2. **Reference:** PID2019-104888GB-I00. Title: *Physical dosimetry of protons and nuclear structure*. Funding institution: Ministerio de Ciencia e Innovación. Call: Plan Nacional I+D+i 2019. Principal investigator: Dra. **Marta Anguiano Millán (IP1)** y Dr. Miguel Ángel Carvajal Rodríguez (IP2). Affiliation: Universidad de Granada. From: 01/06/2020 to 31/05/2023. Total quantity: 117370,00 €
3. **Reference:** P18-RT-2327. Title: *Physical dosimetry of clinical proton beams*. Funding institution: Junta de Andalucía. Call: Proyectos I+D+i Junta de Andalucía 2018. Principal investigator: Dra. **Marta Anguiano Millán (IP1)** y Dr. Miguel Ángel Carvajal Rodríguez (IP2). Affiliation: Universidad de Granada. From: 01/01/2020 to 31/12/2022. Total quantity: 119800,00 €.
4. **Reference:** 857558. Title: *Enhancement of scientific excellence and innovation potential in electronic instrumentation for ionising radiation environments*: ELICSIR. Funding institution: European Union. Call H2020-WIDESPREAD-2018-03, Topic WIDESPREAD-03-2018 Twinning. Spanish Project Coordinator: Alberto J. Palma (UGR). From 01/09/2019 to 28/02/2023. Total Funding: 791,812.5 €. Spanish Funding: 138,750 €. Participation: Research team.
5. **Reference:** PI-0505-2017. Title: *Development of an device for dosimetry in vivo for radiotherapy based in commercial photodiodes and phototransistors*. Funding Institution: Consejería de Salud, Junta de Andalucía.. P.I.: Damián Guirado Llorente. Duration: 01/01/2018-31/12/2020. Funding: 34140,68 €. Participation: Research team.
6. **Reference:** B-TIC-468-UGR18. Title: *Integrated wireless dosimetry system for radiotherapy*. Funding institution: Junta de Andalucía. Call: FEDER, Universidad de Granada. RETOS (Salud, cambio demográfico y bienestar social). Principal investigators: Dr. Miguel A. Carvajal (IP1) and **Dra. Marta Anguiano Millán (IP2)**. Duration: From 01/01/2020 to 31/12/2021. Total quantity: 29400,00 €.
7. **Reference:** FPA2015-67694-P. Title: *Developments for Fundamental Nuclear Physics and Applications*. Funding institution: Ministerio de Economía y Competitividad (MINECO). Call: Plan Nacional I+D+i 2015. Principal investigator: Dr. Daniel Rodríguez Rubiales (IP1) y **Dra. Marta Anguiano Millán (IP2)**. Affiliation: Universidad de Granada. From: 01/01/2016 to 31/12/2019 Total quantity: 176400,00 €
8. **Reference:** FPA2012-31993. Title: *Physical dosimetry and nuclear structure*. Funding institution: Ministerio de Economía y Competitividad (MINECO). Call: Plan Nacional I+D+i 2012. **Principal investigator: Dra. Marta Anguiano Millán**. Affiliation: Universidad de Granada. From 01/01/2013 to 31/12/2015. Total quantity: 31590,00 €
9. **Reference:** FPA2009-14091-C02-02. Title: *Simulación Monte Carlo del transporte de radiación: Física, métodos numéricos y aplicaciones*. Funding institution: Ministerio de Economía y Competitividad (MINECO). Call: Plan Nacional I+D+i 2009. **Principal investigator: Dra. Marta Anguiano Millán**. Afiliación: Universidad de Granada. From 01/01/2010 to 12/31/2012. Total quantity: 98010,00 €.
10. **Reference:** FIS2005-03577. Title: *Collision of electromagnetic probes with nuclei and atoms*. Funding institution: Ministerio de Economía y Competitividad (MINECO). Call: Plan Nacional I+D+i 2009. **Principal investigator:** Antonio M. Lallena. Afiliación: Universidad de Granada. From 01/01/2006 to 31/12/2008. Total quantity: 83300,00 €. Participation: Research team.

C.4. Contracts, technological or transfer merits, Include patents and other industrial or intellectual property activities (contracts, licenses, agreements, etc.) in which you have collaborated. Indicate: a) the order of signature of authors; b) reference; c) title; d) priority countries; e) date; f) Entity and companies that exploit the patent or similar information, if any

1. **Reference:** IPT-300000-2010-3. Title: *PRECISION: Investigaciones en tecnologías de tratamiento guiado por imagen y simulación para un práctica en radioterapia segura*. Funding institution: Ministerio de Ciencia e Innovación. Call: Ayudas al Subprograma INNPACTO 2010. Principal investigator: Mr. Carlos Illana. Afiliación: GMV Aerospace and Defense S.A.. Responsible at University of Granada: Dr. Antonio M. Lallena Rojo. Participation: Investigator. From 01/07/2010 to 31/12/2013. Total quantity: 621.327,00 € (193.127,00 € for University of Granada). Participation: Research team.

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	Óscar		
Family name	Gálvez González		
Gender (*)		Birth date (dd/mm/yyyy)	XXX
Social Security, Passport, ID number	XXXX		
e-mail	oscar.galvez@ccia.uned.es	URL Web https://www.uned.es/universidad/docentes/ciencias/oscar-galvez-gonzalez.html	
Open Research and Contributor ID (ORCID)(*)	0000-0003-2963-9599		

A.1. Current position

Position	Profesor Titular de Universidad		
Initial date	6-10-2020		
Institution	Universidad Nacional de Educación a Distancia		
Department/Center	Facultad de Ciencias, Dpto. Física Interdisciplinar		
Country	Spain	Teleph. number	913986346
Key words	ab initio calculation, FTIR spectroscopy, polymers, photochemistry, iodine, atmospheric chemistry, laboratory astrophysics		

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

Period	Position/Institution/Country/Interruption cause
4/2016-10/2020	Profesor Contratado Doctor / UNED / Spain
12/2010-3/2016	Contratado Ramón y Cajal / Instituto Estructura de la Materia (IEM-CSIC) / Spain
2/2006-11/2010	Contratado Juan de la Cierva – JAE-Doc / IEM-CSIC / Spain
6/2005-1/2006	Becario Postdoctoral (MEC) / Institute of Material Chemistry (Vienna University of Technology) / Austria
10/2004-5/2005	Investigador Postdoctoral / F. Químicas (UCM) / Spain
10/2003-9/2004	Becario Postdoctoral (MEC) / Waterloo Centre for Atmospheric Science University of Waterloo / Canada
3/1999-12/2002	Becario FPI / F. Químicas (UCM) / Spain
9/1998-2/1999	Becario predoctoral / Instituto de Catálisis (CSIC) / Spain

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
Degree in Chemistry	Universidad Complutense de Madrid	1998
PhD in Chemistry	Universidad Complutense de Madrid	2002

Part B. CV SUMMARY (max. 5000 characters, including spaces)

Óscar Gálvez obtained his B.S. in Chemistry in 1998 (Physical-Chemistry) in Universidad Complutense de Madrid (UCM). That year, he got a PhD fellowship for six months at Instituto de Catálisis, CSIC, in Madrid, where he gained valuable experience in experimental techniques, focused on the development of improved three-way catalysts (he published 3 articles which have been cited 460 times). After, he moves to UCM and obtained his PhD degree in the Physical-Chemistry department in 2002. In this period, he carried out a theoretical study by high-level *ab initio* calculations on the formation of molecular clusters by hydrogen bonding interactions. Each of the main articles of his thesis have received more than



100 quotations. Later, he carried out two foreign postdoctoral stays. In 2003-2004, he was working (through a MEC competitive contract) in the University of Waterloo, Canada, where he analysed the contribution from border regions (mainly US) to the tropospheric ozone level registered in south Ontario, by means of atmospheric models. After returned at UCM, in 2005-2006, he moved to work in Vienna University of Technology, Austria, (again by a MEC contract), where he combined theoretical and experimental methods on the study of bromine oxides' properties, which are relevant in the atmospheric ozone depletion. In these years abroad, he gained valuable experience in atmospheric chemistry, established international collaborations (which continues nowadays), published several articles and participated in different international congress. In 2006, he obtained a Juan de la Cierva contract to work in the Instituto de Estructura de la Materia (IEM-CSIC), in Madrid. Subsequently, he got a competitive JAE-Doc contract and finally, in 2010, he gained a Ramón y Cajal position (tenure track in a competitive call) to continue his work in IEM. During this long period (2006 - 2016), he was mainly focused on the study of astrophysical and atmospheric systems by experimental techniques (mainly infrared spectroscopy and quadrupole mass spectrometry) and theoretical high-level *ab initio* calculations. In addition, he started his own research lines, and initiated different scientific collaborations. In 2013, he established a collaboration with Dra. Baeza, in Universidad de Castilla la Mancha, obtaining a competitive Project in the RETOS call of MINECO. Both set up a laboratory to study the formation and properties of iodinated atmospheric aerosols and began to supervise a PhD student (who obtained her PhD degree later). In 2016, Dr. Gálvez achieved a permanent contract as Profesor Contratado Doctor in the Física Interdisciplinar (FisInt) department of Faculty of Science in Universidad Nacional de Educación a Distancia (UNED). In October 2020, he became staff member as Profesor Titular de Universidad. Currently, he is the leader of a UNED [research group](#), which maintained stable collaborations with different foreign (group of [Prof. Grothe](#) in Vienna) and national research groups ([LANAMAP](#) in IQF-CSIC and [SOFMATPOL](#) in IEM-CSIC, in the framework of the Unidad Asociada CSIC [NANOesMAT](#), and [Materia Blanda y Fluidos](#) group at UNED), mainly in the field of material science (polymeric materials and Lagmuir monolayers). He has published 64 articles, 55 of them in JCR index (45 in the first quartile with an average impact factor of 4.15), 6 book chapters and 3 articles in outreach journals. His publications have been cited more than 2100 times and his h-index is 21 (according to WoS). His studies resulted in 105 contributions to conferences (national and international). He has participated in 20 research projects, being PI in 7 of them, granted with a total amount of 342 k€. He obtained 3 "sexenios" and 1 "quinquenio", and has been acting as Expert Reviewer for national research programs (Spain, France or Argentina), and for many Scientific Journals, as: The Journal of Physical Chemistry, Urban Climate, J. Atmos. Solar-Terrest. Phys., RSC Advances, etc.

In the formation of young scientists, Dr. Gálvez has supervised 5 Master, 10 degree and two PhD theses (Dr. Óscar Toledano, 2022, and Dr. Carolina García 2023). He participates in an education innovative group in UNED and has been involved in 4 different projects in this field, in 1 of them as PI. Finally, from October 2017 to September 2021 he was academic coordinator of environmental science degree, from October 2022 to June 2023 he was subdirector of FisInt department in UNED, in which he is the current director since June 2023.

In addition, during his career, Dr. Gálvez has maintained an intense activity in outreach programs. He has participated in 9 outreach projects (8 of them supported by FECYT institution and 1 by CSIC) and he was awarded by UNED in two occasions (2021 and 2023) for the best outreaching project in this institution. He participates in scientific festivals, activities at primary and secondary schools and he is a member of a group of scientific theater since 2013.

Part C. RELEVANT MERITS (sorted by typology)

C.1. Publications (see instructions)

In the field of polymers

- [O. Gálvez](#), O. Toledano, F.J. Hermoso, A. Linares, M. Sanz, E. Rebollar, A. Nogales, M.C. García-Gutiérrez, G. Santoro, I. Irska, S. Paszkiewicz, A. Szymczyk, T. A. Ezquerra. Inter and intra molecular dynamics in Poly(trimethylene 2,5-furanoate) as revealed by Infrared and Broadband Dielectric Spectroscopy. *Polymer* 268 (2023) 125699. <https://doi.org/10.1016/j.polymer.2023.125699>.

- E. Gutiérrez-Fernández, J. Sena-Fernández, E. Rebollar, T.A Ezquerra, F.J. Hermoso-Pinilla, M. Sanz, O. Gálvez, A. Nogales. Stability of polar phases in ferroelectric poly(vinylidene fluoride) (PVDF) nanoparticles. *Polymer*, 264 (2023), 125540. <https://doi.org/10.1016/j.polymer.2022.125540>.
- A. Nogales, M.C. García-Gutiérrez, E. Rebollar, O. Gálvez, I. Šics, M. Malfois and T. Ezquerra. Probing structure development in Poly(vinylidene Fluoride) during “operando” 3-D printing by Small and Wide Angle X-ray Scattering. *Polymer* 249 (2022), 124827. <https://doi.org/10.1016/j.polymer.2022.124827>.

In the field of theoretical simulations on condensed matter or relevant molecular species

- Ó. Toledano, M. Pancorbo, J. E. Alvarellos and Ó. Gálvez. Melting in two-dimensional systems: Characterizing continuous and first-order transitions. *Physical Review B* 103, 094107 (2021). <https://doi.org/10.1103/PhysRevB.103.094107>.
- Ó. Toledano, M.A. Rubio and Ó. Gálvez. Energetics and structures of the tilted phases of fatty acid Langmuir monolayers. *Phys. Chem. Chem. Phys.*, (2020), 22, 12092-12103. <https://doi.org/10.1039/d0cp01361g>.

In the field of iodine chemistry and photochemistry

- C. Moreno, M-T Baeza Romero, M. Sanz, O. Gálvez, V. López Arza, J. C. Ianni and E. Espíldora. Iodide conversion to iodate in aqueous and solid aerosols exposed to ozone. *Phys. Chem. Chem. Phys.*, (2020), 22, 5625-5637. <https://doi.org/10.1039/c9cp05601g>.
- O. Galvez, M.T. Baeza-Romero, M. Sanz and A. Saiz-Lopez. Photolysis of frozen iodate salts as a source of active iodine in the polar environment. *Atmos. Chem. Phys.*, 16, 12703-12713, (2016). <https://doi.org/10.5194/acp-16-12703-2016>.

On the study of astrophysical system by infrared spectroscopy

- Y. Rodríguez-Lazcano, V.J. Herrero, R. Escribano, B. Maté and Ó. Gálvez. The formation of carbamate ion in interstellar ice analogues. *Phys. Chem. Chem. Phys.* (2014), 16, 3371-3380. <https://doi.org/10.1039/c3cp53153h>.
- O. Gálvez, B. Maté, V. J. Herrero, and R. Escribano. HDO Infrared Detection Sensitivity and D/H Isotopic Exchange in Amorphous and Crystalline Ice. *The Astrophysical Journal* (2011), 738, 2, 133. <https://doi.org/10.1088/0004-637X/738/2/133>.
- J. Bernard, M. Seidl, I. Kohl, K.R. Liedl, E. Mayer, O. Gálvez, H. Grothe and T. Loerting. Spectroscopic Observation of Gas-Phase Carbonic Acid Isolated in Matrix. *Angewandte Chemie International Edition*. (2011), 50, 1939 –1943. <https://doi.org/10.1002/anie.201004729>.

C.2. Congress, indicating the modality of their participation (invited conference, oral presentation, poster)

- A. Nogales, E. Gutiérrez-Fernández, J. Sena, E. Rebollar, J. Hermoso-Pinilla, M Sanz, O. Gálvez, T. Ezquerra. Dielectric spectroscopy in Polyvinylidene Difluoride based ferroelectric systems. 11th Broadband Dielectric Spectroscopy and its Applications, 2022. Donostia-San Sebastián, Spain. 4-9 September 2022. Oral.
- M Sanz, O. Gálvez, O. Toledano, F.J. Hermoso, C. García-Arcos. Characterization Studies on polymer materials by infrared spectroscopy. International Congress Nano-Meets-Soft 2022. Madrid, Spain, December 2022. Oral
- O. Toledano, O. Gálvez, M.A. Rubio and P. Español. DFT and Molecular Dynamics Simulations of a Langmuir Monolayer. XXII Congreso de Física Estadística (FisEs'18). Madrid, Spain. Dec 10-14, 2018. Poster.
- F. Weiss, F. Kubel, Ó. Gálvez, M. Hoelzel, S. F. Parker, R. Iannarelli, M. J. Rossi and H. Grothe. Metastable Nitric Acid Trihydrate in Ice Clouds. AGU2018. Washington, D.C, EE.UU. Dec 10-14, 2018. Poster.
- O. Gálvez and A. Saiz-López. Studies on the photolysis of iodate salts. 8th INTERNATIONAL Conference on Advanced Vibrational Spectroscopy. Viena, Austria. 12 – 17 July 2015. Invited Talk.
- O. Gálvez, Y. Rodríguez-Lazcano, B. Maté, V. Herrero, and R. Escribano. Estudio de laboratorio sobre la formación del ión carbamato en hielos del Sistema Solar. III Encuentro



sobre Ciencias Planetarias y Exploración del Sistema Solar. Madrid, España. 19-21 June 2013. Talk.

- O. Gálvez, P. C. Gómez, J. C. Gómez-Martin, A. Saiz-López and L. F. Pacios. Theoretical investigation on iodine oxides formation and their role in the production of atmospheric aerosols. EGU2013. Viena, Austria. 7-12 April 2013. Poster.
- O. Gálvez; B. Maté; Y. Rodríguez-Lazcano; V. J. Herrero; I. Tanarro; R. Escribano. Spectroscopic studies of amino acids in astrophysical analogues. 2nd National Conference on laboratory and Molecular Astrophysics. Sevilla, España. 14-16 Nov. 2012. Invited Talk.
- O. Gálvez. Spectroscopy studies on astrophysical ices. XXIII REUNIÓN NACIONAL DE ESPECTROSCOPIA VII CONGRESO IBÉRICO DE ESPECTROSCOPIA. Córdoba, España. 17-20 September de 2012. Invited Talk.

C.3. Research projects, indicating your personal contribution. In the case of young researchers, indicate lines of research for which they have been responsible.

- *Degradacion fotolitica de microplasticos*. Proyectos Estratégicos Orientados a la Transición Ecológica y a la Transición Digital 2021. Ministerio de Ciencia e Innovación. TED2021-131914B-I00. 01-12-2022 al 30-11-2024 IP: Ó. Gálvez and J. Alvarez. Amount: 143.750 €. N° Researchers: 7.
- Convocatoria de ayudas para la contratación de ayudantes de investigación y técnicos de laboratorio cofinanciadas por Fondo Social Europeo a través del Programa Operativo de Empleo Juvenil y la Iniciativa de Empleo Juvenil (YEI). Comunidad de Madrid. Fondo Social Europeo. PEJ-2021-AI/IND-22209. 01-10-2022 al 30-09-2024. IP: Ó. Gálvez. Amount: two years contract (45.000 €). N° Researchers: 1.
- *Simulación y evaluación de la dinámica de transmisión del virus SARS-CoV-2 en España*. Instituto de Salud Carlos III. CONVOCATORIA DE EXPRESIONES DE INTERÉS PARA LA FINANCIACIÓN DE PROYECTOS DE INVESTIGACIÓN SOBRE EL SARS-COV-2 Y LA ENFERMEDAD COVID19 (Ref. COV20/01081).15-05-2020 al 15-11-2020. IP: Ó. Gálvez González. Amount: 24.500 €. N° Researchers: 1.
- *Multidimensional micro and nano structuring of polymer materials by advanced technologies: from the fundamentals to the applications*. MINISTERIO DE CIENCIA, INNOVACIÓN y UNIVERSIDADES, Proyectos I+D Generación de Conocimiento. PID2019-107514GB-I00. 01-01-2020 al 31-12-2022. IPs: Aurora Nogales y Tiberio Ezquerro. Amount: 100.000 € + FPU contract. N° Researchers: 5 (Equipo de Investigación). Investigador
- *Desarrollo de nuevas prácticas de simulación para su aplicación en Física de Estado Sólido*. Proyecto de Innovación Educativa (PIE) y Actividad de Innovación Educativa (AIE) de UNED. 01-10-2019 al 30-9-2020. IP: Ó. Gálvez. Amount: 1.500 €. N° Researchers: 4.
- *Determination of the photoionization spectra of atmospherically relevant iodine oxides compounds*. SOLEIL Synchrotron, France. 30-09-2015 al 5-10-2015. IP: O. Gálvez. Amount: Sincretón Access. N° Researchers: 5.
- *¿Qué ocurre en nuestra Atmósfera y cómo influye en el Cambio Climático?* FECYT - www.precipita.es - Proyecto Crowdfunding. 01/03/2015 al 31/12/2015. IP: Ó. Gálvez. Amount: 1380 €. N° Researchers: 4.
- *Study of iodine atmospheric processes with climatic implications*. Ministerio de Economía y Competitividad (Programa "RETOS") CGL2013-48415-C2-1-R. 1/1/2014 al 31/12/2015. IP: Ó. Gálvez. Amount: 68.000 € Total Coordinated project 10.000 € CSIC team. N° Researchers: 3.

C.4. Contracts, technological or transfer merits

- Inventores: Sánchez, J.P.; Gálvez, Ó.; Pancorbo, M.; Uguina, P.; Montoya M., Sanz, M.; Tajuelo, J.; Willart, A. "Kit de Fresnel. Óptica Recreativa, del cole a casa".
N.º de solicitud: M-3024-23 N° Asiento Registral: 16 / 2023 / 3857
País de prioridad: España Fecha: 21.04.2023 Entidad titular: UNED
- Inventores: Sánchez, J.P.; Gálvez, Ó.; Pancorbo, M.; Uguina, P.; Montoya, M. "KIT DE FARADAY. Ciencia electromagnética, del cole a casa".
N.º de solicitud: M-2360-21 N° Asiento Registral: 16 / 2021 / 5450
País de prioridad: España Fecha: 07.04.2021 Entidad titular: UNED

Fecha del CVA	27/08/2024
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Parte A. DATOS PERSONALES

Nombre	Pablo		
Apellidos	Dominguez García		
Sexo		Fecha de Nacimiento	
DNI/NIE/Pasaporte			
URL Web			
Dirección Email	pdominguez@fisfun.uned.es		
Open Researcher and Contributor ID (ORCID)			

A.1. Situación profesional actual

Puesto	Profesor Titular de Universidad		
Fecha inicio	2024		
Organismo / Institución	Universidad Nacional de Educación a Distancia		
Departamento / Centro	Física Interdisciplinar / Facultad de Ciencias		
País	España	Teléfono	(0034) 91398 - 9345
Palabras clave	Física ed -- física educacional; Física cs -- sistemas complejos		

A.2. Situación profesional anterior (incluye interrupciones en la carrera investigadora - indicar meses totales, según texto convocatoria-)

Periodo	Puesto / Institución / País
2011 - 2024	Profesor Contratado Doctor / Universidad Nacional de Educación a Distancia
2010 -	Profesor Ayudante Doctor / Universidad Nacional de Educación a Distancia
2007 -	Ayudante / Universidad Nacional de Educación a Distancia

A.3. Formación académica

Grado/Master/Tesis	Universidad / País	Año
Programa Oficial de Doctorado en Física de Sistemas Complejos	Universidad Nacional de Educación a Distancia	2007
Licenciado en Física Especialidad Física Fundamental	Universidad Complutense de Madrid	2002

Parte B. RESUMEN DEL CV

Licenciado en Ciencias Físicas por la Universidad Complutense de Madrid con especialidad en Física Fundamental (2002) y doctor en Ciencias Físicas por la UNED (2007) con Premio Extraordinario de Doctorado de la Facultad de Ciencias de la UNED.

Investigador principal (IP) de un proyecto de investigación para grupos emergentes (UNED), segundo investigador principal (MINECO) y ha participado como investigador en otros 7 proyectos de investigación financiados con fondos públicos.

Evaluación positiva en los tramos solicitados de actividad investigadora (3) y docente (3). Ha realizado estancias de investigación en Arizona State University (ASU, EEUU) y en École Polytechnique Fédérale de Lausanne (EPFL, Suiza). Temas de investigación abordados: micro-estructura y propiedades de coloides magnéticos, microfluídica de gotas sobre superficies superhidrofóbicas, simulaciones de dinámica browniana, y microrreología con técnicas ópticas aplicada a fluidos complejos y biofluidos. Los resultados de esta labor investigadora se recogen en 25 publicaciones (2005-2023) en revistas internacionales de prestigio, en su mayoría como primer autor (17).

Parte C. LISTADO DE APORTACIONES MÁS RELEVANTES

C.1. Publicaciones más importantes en libros y revistas con “peer review” y conferencias

AC: Autor de correspondencia; (nº x / nº y): posición firma solicitante / total autores. Si aplica, indique el número de citas

- 1 **Artículo científico.** (1/1) P Domínguez-García (AC). 2020. Brownian Disks Lab: Simulating time-lapse microscopy experiments for exploring microrheology techniques and colloidal interactions. Computer Physics Communications. Elsevier. 252, pp.107123. ISSN 0010-4655. Google Scholar (1) <https://doi.org/10.1016/j.cpc.2019.107123>
- 2 **Artículo científico.** (1/4) P. Domínguez-García (AC); Giovanni Dieter; László Forró; Sylvia Jeney. 2020. Filamentous and step-like behavior of gelling coarse fibrin networks revealed by high-frequency microrheology. Soft Matter. ROYAL SOC CHEMISTRY. 16-17, pp.4234-4242. ISSN 1744-683X. Google Scholar (3) <https://doi.org/10.1039/c9sm02228g>
- 3 **Artículo científico.** (1/3) P. Domínguez-García (AC); László Forró; Sylvia Jeney. 2016. Interplay between optical, viscous, and elastic forces on an optically trapped Brownian particle immersed in a viscoelastic fluid. Applied Physics Letters. American Institute of Physics. 109-14, pp.143702. ISSN 0003-6951. Google Scholar (7) <https://doi.org/10.1063/1.4964405>
- 4 **Artículo científico.** (1/6) P. Domínguez-García (AC); Frédéric Cardinaux; Elena Bertseva; László Forró; Frank Scheffold; Sylvia Jeney. 2014. Accounting for inertia effects to access the high-frequency microrheology of viscoelastic fluids. Physical Review E. The American Physical Society. 90-060301(R). Google Scholar (19)
- 5 **Artículo científico.** (1/3) P. Domínguez-García (AC); J.M. Pastor; M.A. Rubio. 2011. Aggregation and disaggregation dynamics of sedimented and charged superparamagnetic micro-particles in water suspension. European Physical Journal E. EDP Sciences / Società Italiana di Fisica / Springer-Verlag 2011. 34-4. Google Scholar (30)
- 6 **Artículo científico.** (1/4) P Domínguez-García (AC); Sonia Melle; JM Pastor; M.A. Rubio. 2007. Scaling in the aggregation dynamics of a magnetorheological fluid. Physical Review E. The American Physical Society. 76-5. Google Academics (96)
- 7 **Artículo científico.** Ana Egatz-Gómez; Sonia Melle; A. A. García; et al; Devens Gust; (5/11) P Domínguez-García. 2006. Discrete magnetic microfluidics. Applied Physics Letters. American Institute of Physics. 89-3. Google Academics (108)
- 8 **Artículo científico.** (1/4) Pablo Domínguez-García (AC); Jose R. Pinto.; Sylvia Jeney; Ana Akrap. 2023. Micro-mechanical response and power-law exponents from the longitudinal fluctuations of F-actin solutions. Soft Matter. ROYAL SOC CHEMISTRY. 19-20, pp.3652-3660. ISSN 1744-683X. <https://doi.org/10.1039/D2SM01445A>
- 9 **Artículo científico.** (1/4) P Domínguez-García (AC); M. Pancorbo; F. Ortega; M.A. Rubio. 2018. JColloids: Image analysis for video-microscopy studies of colloidal suspensions. Computer Physics Communications. Elsevier. 231, pp.243-244. ISSN 0010-4655. Google Scholar (5) <https://doi.org/10.1016/j.cpc.2018.04.033>
- 10 **Artículo científico.** A. Butykai; (2/6) P Domínguez-García; F.M. Mor; R. Gaál; L. Forró; S. Jeney. 2017. PFMCal: Photonic force microscopy calibration extended for its application in high- frequency microrheology. Computer Physics Communications. Elsevier. 220, pp.507-508. ISSN 0010-4655. Google Scholar (3) <https://doi.org/10.1016/j.cpc.2017.07.019>
- 11 **Artículo científico.** Manuel Pancorbo Castro; Miguel Ángel Rubio Alvarez; (3/3) Pablo Domínguez García (AC). 2017. Brownian dynamics simulations to explore experimental microsphere diffusion with optical tweezers. Procedia Computer Science. Elsevier. 108, pp.166-174. ISSN 1877-0509. Google Scholar (6) <https://doi.org/10.1016/j.procs.2017.05.231>

- 12 **Artículo científico.** A. Butykai; F.M. Mor; R. Gaál; (4/6) P Domínguez-García; L. Forró; S. Jeney. 2015. Calibration of optical tweezers with non-spherical probes via high-resolution detection of Brownian motion. *Computer Physics Communications*. Elsevier. 196, pp.599-610. Google Scholar (5)
- 13 **Artículo científico.** (1/2) P Domínguez-García (AC); M. A. Rubio. 2013. Single and multi-particle passive microrheology of low-density fluids using sedimented microparticles. *Applied Physics Letters*. American Institute of Physics. 102-074101, pp.074101. ISSN 0003-6951. Google Scholar (9)
- 14 **Artículo científico.** (1/4) Pablo Domínguez-García; Flavio Mor; László Forró; Sylvia Jeney. 2013. Exploiting the color of Brownian motion for high-frequency micro-rheology of Newtonian fluids. *Proc. SPIE, Optical Trapping and Optical Micromanipulation X*. SPIE. 8810-881015. Google Scholar (1)
- 15 **Artículo científico.** (1/1) P Domínguez García (AC). 2012. Microrheological consequences of attractive colloid-colloid potentials in a two-dimensional Brownian fluid. *European Physical Journal E*. EDP Sciences / Società Italiana di Fisica / Springer-Verlag 2011. 35-73. Google Scholar (4)
- 16 **Artículo científico.** (1/2) P Domínguez-García (AC); M.A. Rubio. 2010. Three-dimensional morphology of field-induced chain-like aggregates of superparamagnetic microparticles. *Colloids and Surfaces A- Physicochemical and Engineering Aspects*. Elsevier. 358-1-3, pp.21-27. Google Scholar (18)
- 17 **Artículo científico.** (1/2) P Domínguez-García (AC); M.A. Rubio. 2009. JChainsAnalyser: an ImageJ-based stand-alone application for the study of magneto-rheological fluids. *Computer Physics Communications*. Elsevier. 180-10, pp.1956-1960. Google Scholar (13)
- 18 **Artículo científico.** (1/3) P Domínguez-García (AC); Sonia Melle; M. A. Rubio. 2009. Morphology of anisotropic chains in a magneto-rheological fluid during aggregation and disaggregation processes. *Journal of Colloid and Interface Science*. Elsevier. 333-1, pp.221-229. Google Scholar (23)
- 19 **Artículo científico.** (1/4) P. Domínguez-García (AC); J.M. Pastor; Sonia Melle; M.A. Rubio. 2009. Electrostatic and hydrodynamics effects in a sedimented magnetorheological suspension. *Physical Review E*. The American Physical Society. 80-2. Google Scholar (7)
- 20 **Artículo científico.** John Schneider; Ana Egatz-Gómez; Sonia Melle; S. Lindsay; (5/8) P. Domínguez-García; M.A. Rubio; M. Márquez; Antonio A. García. 2008. Motion of viscous drops on superhydrophobic surfaces due to magnetic gradients. *Colloids and Surfaces A- Physicochemical and Engineering Aspects*. Elsevier. 323-1-3, pp.19-27. Google Scholar (37)
- 21 **Artículo científico.** Ana Egatz-Gómez; J Schneider; P Aella; et al; Antonio A. García; (5/11) P Domínguez-García. 2007. Silicon nanowire and polyethylene superhydrophobic surfaces for discrete magnetic microfluidics. *Applied Surface Science*. Elsevier. 254-1, pp.330-334. Google Scholar (50)
- 22 **Artículo científico.** Antonio A. García; Ana Egatz-Gómez; Solitaire A. Lindsay; et al; Joseph Wang; (4/15) P Domínguez-García. 2007. Magnetic movement of biological fluid droplets. *Journal of Magnetism and Magnetic Materials*. Elsevier. 311-1, pp.238-243. Google Scholar (72)
- 23 **Artículo científico.** Ana Egatz-Gómez; Sonia Melle; A. A. García; et al; Devens Gust; (6/12) Miguel A. Rubio. 2006. Superhydrophobic Nanowire Surfaces for Drop Movement Using Magnetic Fields. 2006 NSTI Nanotechnology Conference and Trade Show - NSTI Nanotech 2006 Technical Proceedings. 2, pp.501-504. ISBN 0-9767985-7-3.
- 24 **Artículo científico.** (1/4) P Domínguez-García; S Melle; OG Calderón; M.A. Rubio. 2005. Doublet dynamics of magnetizable particles under frequency modulated rotating fields. *Colloids and Surfaces A- Physicochemical and Engineering Aspects*. Elsevier. 270, pp.270-276. Google Scholar (23)
- 25 **Capítulo de libro.** (1/2) P Domínguez García (AC); M.A. Rubio. 2011. Hydrodynamics on Charged Superparamagnetic Microparticles in Water Suspension: Effects of Low-Confinement Conditions and Electrostatics Interactions. *Hydrodynamics: Advanced Topics*. Intech. 14, pp.1-29. ISBN 978-953-307-596-9.

C.3. Proyectos o líneas de investigación

- 1 **Proyecto.** PID2020-117080RB-C54, Teoría del Coarse-Graining y técnicas experimentales para sistemas biológicos multiescala. Pep Espanyol. (Universidad Nacional de Educación a Distancia). 01/01/2021-31/12/2024. 50.000 €. Miembro de equipo.
- 2 **Proyecto.** FIS2017-86007-C3-X-UNED, Estructura y dinámica multiescala en materia blanda.. Pep Espanyol. (Universidad Nacional de Educación a Distancia). 01/01/2017-31/12/2020. 45.000 €. Miembro de equipo.
- 3 **Proyecto.** FIS2013-47350-C5-5-R, Materia blanda y nanofluidos en múltiples escalas. Miguel Ángel Rubio Álvarez. (Universidad Nacional de Educación a Distancia). 01/01/2014-31/12/2017. 60.500 €. Investigador principal. Segundo investigador principal.
- 4 **Proyecto.** Comportamiento Dinámico de Sistemas Físicos Complejos: Fluidos magnetoreológicos, fluidos poliméricos y convección en sistemas debilmente confinados. Miguel Ángel Rubio. (Universidad Nacional de Educación a Distancia). 28/12/2001-27/12/2004. 56.675,44 €.
- 5 **Proyecto.** Efectos de la estabilidad coloidal sobre los procesos de agregación en un fluido magneto-reológico.. Pablo Domínguez García. (Universidad Nacional de Educación a Distancia). Desde 01/06/2010. 4.000 €.
- 6 **Proyecto.** Microreología: Estructura y Dinámica de Sistemas Coloidales Confinados.. (Universidad Nacional de Educación a Distancia). Desde 31/12/2009.
- 7 **Proyecto.** Estructura y dinámica de Fluidos Complejos: problemas de volumen y de interfase. Miguel Ángel Rubio Álvarez. (Universidad Nacional de Educación a Distancia). Desde 01/10/2006. 65.340 €.
- 8 **Proyecto.** Fluidodinámica computacional lagrangiana. Mar Serrano Maestro. (Universidad Nacional de Educación a Distancia). Desde 04/09/2006. 4.000 €.
- 9 **Proyecto.** Estructura y dinámica de Fluidos Complejos: fluidos magneto-reológicos y fluidos poliméricos. Miguel Ángel Rubio Álvarez. (Universidad Nacional de Educación a Distancia). Desde 31/12/2005. 10.710 €.
- 10 **Proyecto.** Materiales nanoestructurados de base polimérica: Fenómenos de interfase en relación con sus propiedades y aplicaciones avanzados. Consorcio entre Grupos de Investigación de la Comunidad de Madrid. J Baselga. (Universidad Nacional de Educación a Distancia). Desde 2005. 56.450 €.



Part A. PERSONAL INFORMATION		CV date	31/10/2023
First name	Silvia Noemi		
Family name	Santalla Arribas	DNI	
Gender (*)		Birth date (dd/mm/yyyy)	
Social Security, Passport, ID number			
e-mail	silvia.santalla@uc3m.es	URL Web:	
Open Researcher and Contributor ID (ORCID) (*)		00-0002-6521-526X	

(*) *Mandatory*

A.1. Current position

Position	Associate Professor (Profesor Titular)		
Initial date	16/05/2022		
Institution	Universidad Carlos III de Madrid		
Department/Center	Física	Escuela Politécnica Superior	
Country	Spain	Teleph. number	
Key words	Growth of rugged and biological interfaces. Stochastic geometry. Dynamic structure of surfaces and heterostructures. Molecular dynamics. Entanglement in complex quantum systems.		

A.2. Previous positions (research activity interruptions, art. 14.2.b))

Period	Position/Institution/Country/Interruption cause
01/10/00 – 30/09/05	Teaching Assistant (Ayudante de Escuela Universitaria) / Universidad Carlos III de Madrid / Spain
01/10/05 – 06/09/09	Teaching Assistant (Ayudante) / Universidad Carlos III de Madrid / Spain
07/09/09 – 30/09/13	Assistant professor (Profesor Ayudante Doctor) / Universidad Carlos III de Madrid / Spain
01/10/13 – 15/02/22	Assistant professor (Profesor Visitante) / Universidad Carlos III de Madrid / Spain

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
Graduate in Physics	Facultad de CC. Físicas, Universidad Complutense de Madrid	15/11/1998
Graduate Thesis	Facultad de CC. Físicas, Universidad Complutense de Madrid	26/06/2001
PhD. Thesis	Facultad de CC. Físicas, Universidad Complutense de Madrid	30/01/2008

Part B. CV SUMMARY (*max. 5000 characters, including spaces*)

My research interests lie at the crossroads between condensed matter and statistical physics, extending from biological growth models to the structure of entanglement in quantum many-body systems. The connecting thread is the characterization of fluctuations and strong correlations in complex systems, both classical and quantum, and the applicability of the notion of universality class. I combine analytical and numerical tools, with a special emphasis on visualization and the insight obtained by interdisciplinary collaborations.

I have developed an academic career based on the Physics Department of Universidad Carlos III de Madrid (UC3M), while establishing research bonds with other institutions, such



as the Instituto de Física Teórica (IFT, UAM-CSIC, Madrid), Universidad Nacional de Educación a Distancia (UNED, Madrid), Scuola Internazionale Superiore di Studi Avanzati (SISSA, Trieste) and the Universidade Federal de Viçosa (UFV, Viçosa, Brazil).

My initial research took place at the Departamento de Física Teórica at Universidad Complutense de Madrid (UCM) on the intersection between statistical mechanics and high-energy physics, resulting in one article in Phys. Rev. D and a master thesis (grado de licenciatura) on the non-linear behavior of a pion gas, as it was expected to be observed in large colliders such as LHC at CERN. In 2008 I obtained my Ph.D. applying a variety of mathematical and theoretical tools to the characterization of semiconductor heterostructures under the supervision of Prof. Rosa M. de la Cruz at UC3M while working as a teaching assistant (ayudante), which resulted in the publication of eight articles in indexed journals.

Since 2009 I serve as an assistant professor (prof. ayudante doctor / prof. visitante) at the Physics Department of UC3M, where I have been able to establish my different lines of research. Since that moment I have enjoyed continuous funding from the Spanish Government, as a part of different research teams associated to these lines.

My interest in fractal structures in growing interfaces led to an ongoing collaboration with Prof. Rodolfo Cuerno, at the Mathematics Department of UC3M. Our approach leads to engagement with condensed matter physics experimentalists, such as Prof. Luis Vázquez at ICMM (CSIC), sharing our analytical and numerical tools in order to characterize the observed patterns in the laboratory. Interestingly, the same theoretical tools can be employed in biophysics in order to elucidate the interfaces of growing cell aggregates or bacterial colonies. Following the same approach, we have combined theoretical and experimental work in the same team, with researchers from the Molecular Biology Department at UAM and from the Physics Department of UFV. The power behind the concept of universality is such that we have been able to apply it also to growing structures in social dynamics, where we have considered the dynamics behind the accretion of power and wealth. In all the considered growing structures we have been able to characterize the universality classes in relation to the most relevant underlying mechanisms, providing a very interesting cross-fertilization between statistical mechanics, condensed matter physics and biology. These lines of work have resulted in eight articles in indexed journals.

The characterization of universal dynamics leads to very relevant current mathematical problems, which include random matrix theory, integrability and conformal symmetry. Since 2015, a collaboration with researchers from the Courant Institute led to a research line establishing a link between the dynamics of growing interfaces and the geometry in random manifolds, specially the geodesics and isochrone curves (balls). Again, the concept of universality class comes reinforced, making both theoretical physicists and mathematicians learn together. Currently, I am supervising the Ph.D. work of two students in this line, along with researchers from UNED, developing an application to traffic dynamics. These lines of work have resulted in six articles in indexed journals.

My last line of work is the characterization of the entanglement of quantum complex systems, along with researchers from IFT. It is very interesting to note that the deep mathematical structure behind the universality classes of growing interfaces applies to the dynamics of quantum many-body systems. I have explored these connections in the case of disordered lattices, quantum computation, emergent geometry and the Casimir effect on curved space-times. On this last topic I am supervising a third Ph.D. student, along with researchers from IFT and UNED. These lines of work have resulted in nine articles in indexed journals.

Part C. RELEVANT MERITS (sorted by typology)



C.1. Publications (see instructions)

1. S.N. Santalla, G. Ramírez, S. Singha Roy, G. Sierra, J. Rodríguez-Laguna, *Entanglement links and the quasiparticle picture*, Physical Review B, **107**, L121114 (2023)
2. B. Mula, E.M. Fernández, J. E. Alvarellos, J.J. Fernández, D. García-Aldea, S.N. Santalla, J. Rodríguez-Laguna, *Ergotropy and entanglement in critical spin chains*, Physical Review B, **107**, 075116 (2023)
3. B. Mula, N. Samos Sáenz de Buruaga, G. Sierra, S.N. Santalla, J. Rodríguez-Laguna, *Depletion in fermionic chains with inhomogeneous hoppings*, Physical Review B, **106**, 224204 (2022)
4. E. Rodríguez-Fernández, S.N. Santalla, M. Castro; R. Cuerno, *Anomalous ballistic scaling in the tensionless or inviscid Kardar-Parisi-Zhang equation*, Physical Review E, **106**, 024802 (2022)
5. C. Lajusticia-Costan, S.N. Santalla, J. Rodríguez-Laguna, E. Korutcheva. *Random walkers on a deformable medium*. Journal of Statistical Mechanics: Theory and Experiment, **073207** (2021)
6. B. Mula, S.N. Santalla, J. Rodríguez-Laguna. *Casimir forces on deformed fermionic chains*. Physical Review Research, **3**, 013062 (2021)
7. D. Villarrubia, I. Álvarez Domenech, S.N. Santalla, J. Rodríguez-Laguna and P. Córdoba-Torres. *First-Passage Percolation under extreme disorder: from bond-percolation to Kardar-Parisi-Zhang universality*. Physical Review E, **101**, 062124 (2020)
8. S. Singha Roy, S.N. Santalla, J. Rodríguez-Laguna and G. Sierra. *Entanglement as geometry and flow*. Physical Review B, **101**, 195134 (2020)
9. S.N. Santalla, K. Koroutchev, E. Korutcheva and J. Rodríguez-Laguna. *Power accretion in social systems*. Physical Review E, **100**, 012143 (2019)
10. V. Alba, S.N. Santalla, P. Ruggiero, J. Rodríguez-Laguna, P. Calabrese and G. Sierra. *Unusual area-law violation in random inhomogeneous systems*. Journal of Statistical Mechanics: Theory and Experiment, **023105** (2019)

C.2. Congress

11. S.N. Santalla. *Universal fluctuations of global measurements in planar clusters*. **Poster**. XXIV Congreso de Física Estadística (FisEs'23). Pamplona (España). 25-27/10/2023
12. S.N. Santalla. *Universal fluctuations of global measurements in planar clusters*. **Oral presentation**. StatPhys 28. Tokyo (Japan). 07–11/08/2023.
13. S.N. Santalla. *Geodesics on random surfaces*. **Oral presentation**. StatPhys 27. Buenos Aires (Argentina). 08–12/07/2019.
14. S.N. Santalla. *Nonlocal growth and kinetic roughening in biological systems: bacterial colonies and cell aggregates*. **Poster**. StatPhys 27. Buenos Aires (Argentina). 08–12/07/2019
15. S.N. Santalla. *Entanglement over the rainbow: statistical mechanics of the area law*. **Poster**. StatPhys 27. Buenos Aires (Argentina). 08–12/07/2019
16. S.N. Santalla and S.C. Ferreira. *Non-locality effects in the Eden growth model*. **Poster**. XXI Congreso de Física Estadística (FisEs'17). Sevilla (España). 30/03–01/04/2017
17. S.N. Santalla, J. Rodríguez-Laguna, J.P. Abad, I. Marín, M.M. Espinosa, J. Muñoz-García, L. Vázquez and R. Cuerno. *Fronts of compact bacterial colonies are not in the KPZ universality class*. **Oral presentation**. XX Congreso de Física Estadística (FisEs'15). Badajoz (España). 05–07/10/2015
18. S.N. Santalla, J. Rodríguez-Laguna, T. LaGatta and R. Cuerno. *Random geometry and the KPZ universality class*. **Poster**. Interface fluctuations and KPZ universality class. Kyoto (Japan). 20–23/08/2014
19. S.N. Santalla, J. Rodríguez-Laguna and R. Cuerno. *The role of topology on the Kardar-Parisi-Zhang universality class*. **Oral presentation**. International Conference on Statistical Physics (SigmaPhi2014). Rhodes (Greece). 07–11/07/2014



20. S.N. Santalla, J. Rodríguez–Laguna, T. LaGatta and R. Cuerno. *Random geometry and the KPZ universality class*. **Poster**. International Conference on Statistical Physics (SigmaPhi2014). Rhodes (Greece). 07–11/07/2014

C.3. Research projects

21. Reference: PID2021-123969NB-I00, AGENCIA ESTATAL DE INVESTIGACION (AEI) (Spain)
Title: Emergence of Generic Scale Invariance in Dynamical Complex Systems (MELVILLE)
Main researcher: Rodolfo Cuerno Rejado
Affiliation Entity: Universidad Carlos III de Madrid
Type of participation: Researcher
From 01/01/2022 to 31/12/2025
22. Reference: PGC2018-094763-B-I00, MINISTERIO DE CIENCIA, INNOVACIÓN Y UNIVERSIDADES (Spain)
Title: Simetría y geometría en las fluctuaciones de sistemas espacialmente extensos lejos del equilibrio (Symmetry and geometry in fluctuations of spatially-extended systems far from equilibrium)
Main researcher: Rodolfo Cuerno Rejado and Pedro Córdoba Torres
Affiliation Entity: Universidad Carlos III de Madrid
Type of participation: Researcher
From 01/01/2019 to 30/11/2022
23. Reference: P2018/TCS-4342; Programas de Actividades de I+D entre grupos de investigación de la Comunidad de Madrid en tecnologías 2018 (España)
Title: Quantum Information Technologies Madrid
Main researcher: Miguel Angel Martín-Delgado Alcántara; Luis Alberto Ibort Latre; Juan José García Ripoll; David Perez García; Vicente Martín Ayuso; Germán Sierra Rodero; Dolores del Campo Maldonado
From 01/2019 to 12/2022
Type of participation: Researcher
24. Reference: Conselho Nacional de Desenvolvimento Científico e Tecnológico (Brasil)
Title: Processos com muitos agentes interagentes em redes complexas e regulares
Main researcher: Silvio C. Ferreira
From 01/2019 to 12/2021
Type of participation: Researcher
25. Reference: FIS2015-66020-C2-1-P, MINISTERIO DE ECONOMIA, INDUSTRIA Y COMPETITIVIDAD (Spain), 23 716.00€.
Title: Auto-organización y fluctuaciones en frentes de crecimiento, erosión y delaminado: teoría y simulación (Self-organization and fluctuations in growth, erosion, and dewetting fronts)
Main researcher: Rodolfo Cuerno Rejado
Affiliation Entity: Universidad Carlos III de Madrid
Type of participation: Researcher
From 01/01/2016 to 31/12/2018
26. Reference: FIS2012-38866-C05-01, MINISTERIO DE ECONOMIA, INDUSTRIA Y COMPETITIVIDAD (Spain), 35 100.00€
Title: Modelización y simulación de dinámica interfacial de materia dura y blanda (Modeling and simulation of interface dynamics in hard and soft matter)
Main researcher: Rodolfo Cuerno Rejado
Affiliation Entity: Universidad Carlos III de Madrid
Type of participation: Researcher
From 01/01/2013 to 30/09/2016

C.4. Contracts, technological or transfer merits