CV Date	22/12/2024

Part A. PERSONAL INFORMATION

First Name	Manuel		
Family Name	Arrayás Chazeta		
Sex		Date of Birth	
ID number Social Security, Passport			
URL Web			
Email Address			
Open Researcher and Contributor ID (ORCID)			

A.1. Current position

Job Title	Catedrático de Universidad		
Starting date	2023		
Institution	Universidad Rey Juan Carlos		
Department / Centre	Área de Electromagnetismo / Escuela Superior de Ciencias Experimentales y Tecnología		
Country		Phone Number	
Keywords	Physics & space science		

Part B. CV SUMMARY

Physics degree at Universidad de Sevilla. PhD on stochastic processes and fluctuations out of equilibrium at Lancaster University (UK). Postdoc position on low temperature plasmas at Instituut-Lorentz (Leiden) and Centrum voor Wiskunde en Informatica (Amsterdam). Since 2004 lecturer in Electromagnetism at Universidad Rey Juan Carlos, working on electromagnetic knots, gamma ray bursts, ionization fronts and cosmology. Current research topics: ultra low temperature and superfluidity in collaboration with Lancaster University, and nanoresonators in collaboration with IMDEA Nanoscience Institute. Some recent work on genomic data processing.

Authoring about 60 publications (including 3 books), 56 works submitted to national or international conferences, and 12 invited talks. The publication Spontaneous Branching of Anode-Directed Streamers Between Planar Electrodes (Physical Review Letters, 2002) made Ute Ebert to win the Minerva price 2004 as the best contribution made by a woman on physics in the last two years. With J. L. Trueba we discovered a mechanism for the exchange of helicy in electromagnetic fields in vacuum (Annalen Der Physik. 524-2, pp.71-75, 2011) and wrote a Physics Reports in 2017 on electromagnetic knots. In 2018 with colleagues from Lancaster University we explained a novel effect on the A-B interface of superfluid He3 called orbitropic effect. Recently we have developed a new probe to study superfluidity (Scientific Reports 11, 20069, 2021).

Committee member of the evaluation panel for the Talent Hub II Marie Curie Program, and Spanish representative for the action COSTP-18 (European Science Fundation). Member of the organizing board of some international congresses and referee of several journals (PRL, PRE, Scientic Reports to cite a few). I have participated in 8 international projects, 2 of then as IP and I got a Marie Curie grant.

B.1. Brief summary of the Undergraduate Thesis (or equivalent) and score obtained

Licenciado en Física por la Universidad de Sevilla. Estudios de doctorado en la Universidad de Lancaster, Reino Unido, sobre fluctuaciones fuera del equilibrio y procesos estocásticos. Postdoctorado en el Instituut-Lorentz (Universidad de Leiden) y en el Centrum voor Wiskunde en Informatica en Amsterdam sobre plasmas de bajas temperaturas y streamers como

precursores de la ruptura dieléctrica. Desde 2004, como titular de universidad en el área de electromagnetismo, y luego como catedrático, he trabajado en nudos electromagnéticos y en teorías sobre la ignición
de explosiones gamma en la atmósfera terrestre, así como en la estabilidad de frentes de ionización, y cosmología. Otra área de investigación activa es el estudio de la superfluidez a bajas temperaturas en colaboración con la Universidad de Lancaster, y el comportamiento de nanoresonadores, en colaboración con el Instituto IMDEA de Nanociencia. También he realizado algunos trabajos en genómica.

Un total de unas 60 publicaciones (3 libros entre ellas), unas 56 contribuciones a congresos, y unas 12 conferencias invitadas. La publicación de Spontaneous Branching of Anode-Directed Streamers Between Planar Electrodes en 2002, en la revista Physical Review Letters, hizo que uno de los tres coautores, Ute Ebert, recibiera el premio Minerva 2004. El premio es cada dos años y se otorga en reconocimiento a la mejor contribución realizada por una mujer sobre un tema de física. En 2017 he publicado un resumen del estado de arte sobre nudos electromagnéticos en Physics Reports. En 2018 descubrí con colegas ingleses el llamado efecto orbitrópico en la fase B de He3 superfluido. Recientemente hemos desarrollado una nueva sonda para estudiar superfluidez (Scientific Reports 11, 20069, 2021).

Miembro del comité de evaluación del Programa Talent Hub II Marie Curie, para la Agencia Andaluza del Conocimiento, y representante español en la acción COST-P18, de la Europeam Science Fundation. He participado en la organización de congresos internacionales, y soy referee para varias revistas. También he participado en 7 proyectos internacionales, dos de ellos como investigador principal y he disfrutado de una beca Marie Curie.

Part C. RELEVANT ACCOMPLISHMENTS

C.1. Most important publications in national or international peer-reviewed journals, books and conferences

AC: corresponding author. (nº x / nº y): position / total authors. If applicable, indicate the number of citations

1 **Scientific paper**. Marco A. Fontelos; Carlos Uriarte; Manuel Arrayás. 2024. Phase field modeling of the detachment of bubbles from a solid substrate. Physics of Fluids. AIP. 36, pp.062001.
2 **Scientific paper**. Manuel Arrayás. 2023. Progress on Levitating a Sphere in Cryogenic Fluids. Journal of Low Temperature Physics.
3 **Scientific paper**. Manuel Arrayás; José Luis Trueba; Carlos Uriarte. 2022. Machine learning techniques in magnetic levitation problems. Chaos, Solitons & Fractals. 167, pp.113043.
4 **Scientific paper**. Manuel Arrayás; José Luis Trueba; Alfredo Tiemblo. 2022. The The quest of null electromagnetics knots from Seifert fibration. Chaos, Solitons & Fractals. 166, pp.113002.
5 **Scientific paper**. M. Arrayás; J. L. Trueba; C. Uriarte; D. E. Zmeev. 2021. Design of a system for controlling a levitating sphere in superfluid 3He at extremely low temperatures.Scientific Reports. 11, pp.20069.
6 **Scientific paper**. N. González-Benítez; M. C. Molina; M. Arrayás. 2021. Empirical Evidence and Mathematical Modelling of Carbamazepine Degradative Kinetics by a Wood-Rotting Microbial Consortium. Waste and Biomass Valorization. 12-2, pp.995-1003.
7 **Scientific paper**. N. González-Benítez; I. Martín-Rodríguez; I. Cuesta; M. Arrayás; J. F. White; M. C. Molina. 2021. Endophytic microbes are tools to increase tolerance in jasione plants against arsenic stress.Frontiers in Microbiology. 12, pp.664271.
8 **Scientific paper**. M. Arrayás; M.A. Fontelos. 2021. Lateral instability in a discharge channel. Chaos, Solitons and Fractals. 147, pp.111001.

9 **Scientific paper**. R W Tucker; T J Walton; M Arrayás; J L Trueba. 2019. A new paradigm for the dynamics of the early Universe. Classical and Quantum Gravity. 36, pp.245016-245016-33.

10 **Scientific paper**. Manuel Arrayás; Antonio F. Rañada; Alfredo Tiemblo; José L. Trueba. 2019. Null Electromagnetic Fields from Dilatation and Rotation Transformations of the Hopfion. Symmetry. 11, pp.1105-1105-17.

11 **Scientific paper**. Manuel Arrayás; José Luis Trueba. 2019. The method of Fourier transforms applied to electromagnetic knots. European Journal of Physics. 40-1, pp.015205.

12 **Scientific paper**. Manuel Arrayás; José Luis Trueba. 2018. On the fibration defined by the field lines of a knotted class of electromagnetic fields at a particular time. Symmetry. 9.

13 **Scientific paper**. Manuel Arrayás; José Luis Trueba. 2018. Orbitropic Effect in Superfluid 3He B-phase Boundaries. Scientific Reports. 8, pp.13965.

14 **Scientific paper**. Manuel Arrayás; José Luis Trueba. 2018. Spin-orbital momentum decomposition and helicity exchange in a set of non-null knotted electromagnetic fields. Symmetry. 88.

15 **Scientific paper**. Manuel Arrayás; José Luis Trueba. 2018. Wakefield acceleration in planetary atmospheres: A possible source of MeV electrons. The collisionless case.J. Atmos. Solar-Terrestrial Phys.172, pp.69-74.

16 **Scientific paper**. M. Arrayás and J L Trueba. 2017. Collision of two hopfions. Journal of Physics A: Mathematical and Theoretical. 50-8, pp.085203-085203.

17 **Scientific paper**. M. Arrayás; D. Bouwmeester; J.L. Trueba. 2017. Knots in electromagnetism. Physics Reports. Elsevier {BV}. 667, pp.1-61.

18 **Scientific paper**. M.C. Molina; N. González-Benítez; R. Simarro; et al; M.A. Quijano. 2016. Bioremediation techniques for naproxen and carbamazepine elimination.Chimica Oggi - Chem. Today.34-2, pp.52-55.

19 **Scientific paper**. Arrayas, Manuel; Trueba, Jose L.2015. A class of non-null toroidal electromagnetic fields and its relation to the model of electromagnetic knots. Journal of Physics a-Mathematical and Theoretical. 48-2.

20 **Scientific paper**. Arrayas, M.; Fisher, S. N.; Haley, R. P.; Pickett, G. R.; Skyba, M.2014. Orbital Damping of the Oscillating Superfluid He A-B Interface at Low Temperatures. Journal of Low Temperature Physics. 175-5-6, pp.706-717.

21 **Scientific paper**. Arrayas, Manuel; Trueba, Jose L.2012. Exchange of helicity in a knotted electromagnetic field. Annalen Der Physik. 524-2, pp.71-75.

22 **Scientific paper**. Arrayas, M.; Fontelos, M. A.; Kindelan, U.2012. Onset of treelike patterns in negative streamers. Physical Review E. 86-6.

23 **Scientific paper**. Arrayas, M.2012. QUANTUM BROWNIAN MOTION IN A PERIODIC POTENTIAL: THE PATH INTEGRAL FOR A SUPER-OHMIC BATH. Fluctuation and Noise Letters. 11-1.

24 **Scientific paper**. Arrayas, M.; Fontelos, M. A.2011. Electric-discharge contour-dynamics model: The effects of curvature and finite conductivity. Physical Review E. 84-2.

25 **Scientific paper**. Arrayas, M.; Fontelos, M. A.; Jimenez, C.2010. Contour dynamics model for electric discharges. Physical Review E. 81-3.

26 **Scientific paper**. Montanya, J.; van der Velde, O.; Romero, D.; et al; Soula, S.2010. High-speed intensified video recordings of sprites and elves over the western Mediterranean Sea during winter thunderstorms. Journal of Geophysical Research-Space Physics. 115.

27 **Scientific paper**. Arrayas, M.; Trueba, J. L.2010. Motion of charged particles in a knotted electromagnetic field. Journal of Physics a-Mathematical and Theoretical. 43-23.

28 **Scientific paper**. Arrayas, Manuel; Betelu, Santiago; Fontelos, Marco A.; Trueba, Jose L.; Crosby, NB; Huang, TY; Rycroft, MJ. 2009. Analytical Estimates of the Dispersion Curve in Planar Ionization Fronts. Coupling of Thunderstorms and Lightning Discharges To Near-Earth Space. 1118, pp.68-72.

29 **Scientific paper**. March, Victor; Arrayas, Manuel; Luis Trueba, Jose; Montanya, Joan; Romero, David; Sola, Gloria; Aranguren, Daniel. 2009. Features of electrical discharges in air triggered by laser. Journal of Electrostatics. 67-2-3, pp.301-306.

30 **Scientific paper**. Trueba, J. L.; Arrayas, M.2009. Vorticity field, helicity integral and persistence of entanglement in reaction-diffusion systems. Journal of Physics a-Mathematical and Theoretical. 42-28.
31 **Scientific paper**. Arrayas, Manuel; Fontelos, Marco A.; Trueba, Jose L.2008. Comment on "Mechanism of Branching in Negative Ionization Fronts" - Reply. Physical Review Letters. 101-13.
32 **Scientific paper**. Arrayas, Manuel; Betelu, Santiago; Fontelos, Marco A.; Trueba, Jose L.2008. Fingering from ionization fronts in plasmas. Siam Journal on Applied Mathematics. 68-4, pp.1122-1145.
33 **Scientific paper**. Arrayas, Manuel; Baltanas, J. P.; Trueba, Jose L.2008. Fluctuation charge effects in ionization fronts. Journal of Physics D-Applied Physics. 41-10.
34 **Scientific paper**. Arrayas, Manuel; Fontelos, Marco A.; Trueba, Jose L.2006. Photoionization effects in ionization fronts. Journal of Physics D-Applied Physics. 39-24, pp.5176-5182.
35 **Scientific paper**. Arrayas, Manuel; Fontelos, Marco A.; Trueba, Jose L.2006. Power laws and self-similar behaviour in negative ionization fronts. Journal of Physics a-Mathematical and General. 39-23, pp.7561-7578.
36 **Scientific paper**. Arrayas, M; Trueba, JL. 2005. Investigations of pre-breakdown phenomena: streamer discharges. Contemporary Physics. 46-4, pp.265-276.
37 **Scientific paper**. Arrayas, M; Fontelos, MA; Trueba, JL. 2005. Ionization fronts in negative corona discharges. Physical Review E. 71-3.
38 **Scientific paper**. Arrayas, M; Fontelos, MA; Trueba, JL. 2005. Mechanism of branching in negative ionization fronts. Physical Review Letters. 95-16.
39 **Scientific paper**. Arrayas, M. 2004. On negative streamers: A deterministic approach. American Journal of Physics. 72-10, pp.1283-1289.
40 **Scientific paper**. Arrayas, M; Ebert, U. 2004. Stability of negative ionization fronts: Regularization by electric screening?. Physical Review E. 69-3.
41 **Scientific paper**. Huisman, J; Arrayas, M; Ebert, U; Sommeijer, B. 2002. How do sinking Phytoplankton species manage to persist?. American Naturalist. 159-3, pp.245-254.
42 **Scientific paper**. Arrayas, M; Ebert, U; Hundsdorfer, W. 2002. Spontaneous branching of anode-directed streamers between planar electrodes. Physical Review Letters. 88-17.
43 **Scientific paper**. Ebert, U; Arrayas, M; Temme, N; Sommeijer, B; Huisman, J. 2001. Critical conditions for phytoplankton blooms. Bulletin of Mathematical Biology. 63-6, pp.1095-1124.
44 **Scientific paper**. Soskin, SM; Sheka, VI; Linnik, TL; Arrayas, M; Kaufman, IK; Luchinsky, DG; McClintock, PVE; Mannella, R. 2001. Noise-induced escape on time scales preceding quasistationarity: New developments in the Kramers problem. Chaos. 11-3, pp.595-604.
45 **Scientific paper**. Soskin, SM; Mannella, R; Arrayas, M; Silchenko, AN. 2001. Strong enhancement of noise-induced escape by nonadiabatic periodic driving due to transient chaos. Physical Review E. 63-5.
46 **Scientific paper**. Arrayas, M; Kaufman, IK; Luchinsky, DG; McClintock, PVE; Soskin, SM. 2000. Kramers problem for a multiwell potential. Physical Review Letters. 84-12, pp.2556-2559.
47 **Scientific paper**. Arrayas, M; Mannella, R; McClintock, PVE; McKane, AJ; Stein, ND. 2000. Ratchet driven by quasimonochromatic noise. Physical Review E. 61-1, pp.139-146.
48 **Scientific paper**. Arrayas, M; Dykman, MI; Mannella, R; McClintock, PVE; Stein, ND. 2000. Symmetry breaking of fluctuation dynamics by noise color. Physical Review Letters. 84-24, pp.5470-5473.
49 **Scientific paper**. Arrayas, M; Casado, JM; Ordonez, JG; McClintock, PVE; Morillo, M; Stein, ND. 1998. Dispersion of the prehistory distribution: Analog experiments and numerical results. Physical Review Letters. 80-11, pp.2273-2276.
50 **Scientific paper**. Arrayas, M; McClintock, PVE; Stein, ND; Mannella, R; McKane, AJ; Claeys, C; Simoen, E. 1997. Current reversals in a ratchet driven by quasimonochromatic noise. Noise in Physical Systems and 1/f Fluctuations, Proceedings of the 14th International Conference. pp.381-384.