MINISTERIO DE CIENCIA, INNOVACIÓN Y UNIVERSIDADES

CURRICULUM VITAE (maximum 4 pages)

CV date	08-12-2020

Part A. PERSONAL INFORMATION

First and Family name	Manuel DONAIRE DEL YERRO		
Researcher numbers		Researcher ID	D-9055-2018
		ORCID code	0000-0001-5082-9616

A.1. Current position

Name of University/Institution	Universidad de Valladolid			
Department	Departamento de Física Teórica, Atómica y Óptica			
Address and Country	Paseo de Belén, 7, E-47011 Valladolid (Spain)			
Phone number	983 424573	E-mail	manuel.donaire@uva.es	
Current position	Profesor Ayudante Doctor		From	2018
UNESCO code	221212 Quantum Field Theory			
Key words	Elementary Particles, Quantum Optics, Topological Defects, Vacuum Phenomena			

A.2. Education

Degree	University	Year
PhD in Theoretical Physics and Applied Mathematics	The University of Cambridge	2007
Certificate (Master) of Advanced Study in Mathematics	The University of Cambridge	2002
Estudios Avanzados de Física Teórica	Universidad Autónoma de Madrid	2000
Licenciatura en C.C. Físicas	Universidad Autónoma de Madrid	1999

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

- Research activity: 2 *sexenios* awarded by *la Agencia de Calidad y Prospectiva Universitaria de Aragón* (ACPUA) in 2017; **I3** Programme certificate by *la Agencia Estatal de Investigación (Ministerio de Ciencia, Innovación y Universidades)* .
- H index, 8.
- Number of JCR articles (WOS), 24, out of which, 18 are Q1, 3 are Q2 and 3 are Q3. These are, 2 Phys. Rev. Lett., 1 Eur. Phys. Lett., 1 New. J. Phys., 1 Phys. Rev. D, 2 JHEP, 8 Phys. Rev. A, 1 J. Phys.: Condensed Matter, 1 J. Phys. A, 1 Int. J. Mod. Phys., 1 Eur. Phys. J. D, 1 SPIE, 1 Symmetry-MDPI, 1 Phys. Rev. E, 1 Eur. Phys. J. C, and 1 IEEE. It is of note that 9 of these articles are single author articles.
- Thesis supervised.

  . 3 TFG (*Trabajos Fin de Grado*): 2 of them on the degree of Primary Teaching Education, and 1 in the degree of Physics entitled ‘An analogous of Hawking Radiation: Spontaneous Emission from an Accelerated Atom’.

  . 1 Master thesis entitled ‘Van der Waals resonant interaction: Net harmonic force in a two-atom system’. Master student: Julio Sánchez Cánovas; reading date: July 2019.

  . 2 PhD thesis in progress, entitled:

  ‘Topological defects formation in a ferroelectric system: Beyond Kibble-Zurek’s mechanism in a field theory with global symmetry’. PhD student: Marcos Tello Fraile; expected date of reading: July 2021.

  ‘Dynamical quantum vacuum effects in atomic interactions’. PhD student: Julio Sánchez Cánovas; expected date of reading: 2024.

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

Since graduated, my research activity has been developed in a number of areas of theoretical physics, in several international research institutions. In particular, my research works have focused on Classical and Quantum Field Theories, both on fundamental as well as on phenomenological aspects.

Once graduated from the Universidad Autónoma de Madrid –with Honors and *Premio Nacional Fin de Carrera,* I did a one-year stay at the Instituto de Física Teórica (IFT), working on string theory. Following up the one-year course of the Part III of the Mathematical Tripos, I did my PhD studies at The University of Cambridge, in the group of High Energy Physics and Gravitation. The topic of my PhD thesis was the formation of topological defects in gauge field theories. Both the formation of cosmic strings in cosmological phase transitions, and the formation of spontaneous thermal vortices in superconductors were addressed in that investigation.

After reading my thesis, I have been working in other domains of theoretical physics. These are, classical electromagnetism in random media at the Universidad Autónoma de Madrid; vacuum phenomena and molecular quantum electrodynamics at the Centro de Física do Porto (with a Ramón-Areces Foundation scholarship); quantum optics and magnetoelectric effects at the Laboratoire de Physique et Modélisation des Milieux Condensés (LPMMC)-CNRS in Grenoble; and quantum optics, vacuum phenomena and interatomic interactions at the Laboratoire Kastler-Brossel (LKB)-ENS-Collège de France, in Paris.

Currently, I am part of the academic staff of the Department of Theoretical Physics in the Universidad de Valladolid. My current research interests are, formation of topological defects in condensed matter systems, carried out in collaboration with the PhD student Marcos Tello; atomic interactions, in collaboration with the PhD student Julio Sánchez; and Casimir momentum in nuclear and electromagnetic systems. As a lecturer, my academic duties include the courses of Quantum Field Theory and Particle Physics in the Master degree programme.

As a result of my research activity I have published twenty-four articles in international journals – see list of journals in Sec.A.3 and list of recent articles in Sec.C.1, nine of which are single author articles. During my stay in the aforementioned international research centres, I have given more than thirty seminars and colloquia, and I have participated in more than thirty international meetings, where I have given six invited-talks. Also, I have contributed to the development and/or execution of more than a dozen of research projects, five of which were funded by the European Union –see some of them in Secs.C.2, C.3. I got '*la qualification de maître de conférences'* from the French Ministry of Education, and the I3 certificate from the '*Agencia Estatal de Investigación*' in Spain. Finally, as a result of my collaboration with experimentalists, I have co-authored the patent of an experimental setup for the discrimination of the enantiomer species of paramagnetic complexes --see Sec. C.4.

Part C. RELEVANT MERITS

C.1. Publications (up to 10 in the last 5 years, including books)

[1] **'**Acceleration of an unpolarized proton along a uniform magnetic field: Casimir momentum of leptons', M. Donaire, JHEP **10** 041 (2019); ISSN 1029-8479, DOI: 10.1007/JHEP10(2019)041.

[2] 'Dipole-dipole interaction in cavity QED: The weak-coupling, nondegenerate regime', M. Donaire, J.M. Muñoz-Castañeda and L.M. Nieto, Physical Review A **96**, 042714 (2017); ISSN 1050-2947, DOI: 10.1103/PhysRevA.96.042714.

[3] **'**Net force on an asymmetrically excited system from vacuum fluctuations', M. Donaire, Physical Review A **94**, 062701 (2016); ISSN 1050-2947, DOI: 10.1103/PhysRevA.93.052706.

[4] 'Two-atom interaction energies with one atom in an excited state: van der Waals potentials versus level shifts', M. Donaire, Physical Review A **93**, 052706 (2016); ISSN 1050-2947, DOI: 10.1103/PhysRevA.93.052706.

[5] 'Velocity-dependent dipole forces on an excited atom', M. Donaire and A. Lambrecht, Physical Review A **93**, 022701 (2016); ISSN 1050-2947, DOI: 10.1103/PhysRevA.93.022701.

[6] 'Coherent effect of vacuum fluctuations on driven atoms', M. Donaire and A. Lambrecht, Physical Review A **92**, 013838 (2015); ISSN 1050-2947, DOI: 10.1103/PhysRevA.92. 013838.

[7] **'**Quasiresonant van der Waals interaction between nonidentical atoms', M. Donaire, R. Guérout and A. Lambrecht, Physical Review Letters **115**, 033201(2015); ISSN 0031-9007, DOI: 10.1103/PhysRevLett.115.033201.

[8] 'Transfer of linear momentum from the quantum vacuum to a magnetochiral molecule', M. Donaire, B. van-Tiggelen and G. Rikken, Journal of Physics: Condensed Matter **27**, 214002 (2015); p-ISSN: 0953-8984, eISSN: 1361-648X, DOI:10.1088/0953-8984/27/21/214002.

[9] 'Casmir-Polder-induced Rabi oscillations', M. Donaire, M.-P. Gorza, A. Maury, R. Guérout and A. Lambrecht, Europhysics Letters **109**, 24003 (2015); p-ISSN 0295-5075, e-ISSN 1286-4854, DOI:10.1209/0295-5075/109/24003.

[10] **'**Casimir Momentum of a Chiral Molecule in a Magnetic Field', M. Donaire, B. van-Tiggelen and G. Rikken, Physical Review Letters **111**, 14602 (2013); ISSN 0031-9007, DOI: 10.1103/PhysRevLett. 111.143602.

C.2. Research projects and grants

1. Title: Mathematical modelisation in quantum technologies and nanomaterials.
. Affiliation: Departamento de Física Teórica, Atómica y Óptica, Universidad de Valladolid.
. Funding body and reference no.: JCyL, BU229P18.
. P.I.: Prof. Ángel Ballesteros.
. Project duration and budget: 2018-2021, 120.000 euro.
. Participation: Development and execution of project.

2. Title: Integrable systems in Mathematical Physics and applications to Condensed Matter.
. Affiliation: Departamento de Física Teórica, Atómica y Óptica, Universidad de Valladolid.
. Funding body and reference no.: JCyL, VA137G18.
. P.I.: Prof. Javier Negro.
. Project duration and budget: 2018-2020, 12.000 euro.
. Participation: Execution of project.

3. Title: New challenges in supersymmetric and superintegrable systems.
. Affiliation: Departamento de Física Teórica, Atómica y Óptica, Universidad de Valladolid.
. Funding body and reference no.: MINECO, MTM2014-57129-C2-1-P.
. P.I.: Profs. Luis Miguel Nieto and Javier Negro.
. Project duration and budget: 2015-2018, 103.000 euro.
. Participation: Execution of project.

4. Title: Particle Physics and Cosmology.
. Affiliation: Centro de Física do Porto, Universidade do Porto.
. Funding body and reference no.: *Fundação para a Ciência e a Tecnologia* de Portugal (FCT) y el *Conseil européen pour la recherche nucléaire* (CERN), CERN/FP/116358/2010.
. P.I.: Prof. Pedro Pina Avelino, Prof. Miguel Costa and Dr. Filipe P. de Mendonça Correia.
. Project duration: 2010-2012.
. Participation: Development and execution of project.

5. Title: Consolider NANOLIGHT, Light Control on the Nanoscale.
. Affiliation: Universidad Autónoma de Madrid.
. Funding body and reference no.: MICINN, *Programa Consolider*, CSD2007-00046-MICINN.

. P.I.: Prof. Juan J. Sáenz.
. Project duration and budget: 2007-2012, 242.000 euro.
. Participation: Execution of project.

6. Title: NanoMagMa, Nanostructured active Magnetoplasmonic Materials.
. Affiliation: Universidad Autónoma de Madrid.
. Funding body and reference no.: FP7 Europan Commission, NMP3-2008-214107.
. P.I.: Prof. Juan J. Sáenz and Dr. Antonio García Martín.
. Project duration and budget: 2008-2011, 144.600 euro.
. Participation: Execution of project.

7. Title: MICROSERES-CM, *Microsistemas ópticos sensores resonantes*.
. Affiliation: Universidad Autónoma de Madrid.
. Funding body and reference no.: Comunidad de Madrid, I+D program, S-0505/TIC-0191.
. P.I.: Prof. Juan J. Sáenz and Dr. Antonio García Martín.
. Project duration: 2007-2009.
. Participation: Execution of project.

C.3. Contracts

1. Title: Modelisation of Graphene and other materials: Defects, photoelectronic properties and applications.
. Affiliation: Departamento de Física Teórica, Atómica y Óptica, Universidad de Valladolid.
. Funding body and reference no.: JCyL-Feder, VA057U16-JyC. I+D agreement with GRAPHENEA.
. P.I.: Prof. Luis Miguel Nieto.
. Contract duration and budget: 2016-2018, 120.000 euros.
. Participation: Postdoc contract.

2. Title: ForCaG, *Forces de Casimir et gravitation à courte distance*.
. Affiliation: Université Pierre et Marie Curie, École Normal Supérieure, Collège de France.
. Funding body and reference no.: *Agence Nationale de Recherche*, France, ANR-13-BS04–0003-02.
. P.I.: Prof. Astrid Lambrecht and Dr. Frank Pereira.
. Contract duration and budget: 2013-2016, 300.000 euro.
. Participation: *Chercheur associé*.

3. Title: PHOTONIMPULS, *Impulsion Photonique*.
. Affiliation: Université Joseph Fourier, Grenoble; LNCMI, LPPMMC, CNRS Rhon-Alpes.
. Funding body and reference no.: *Agence Nationale de Recherche*, France, ANR-09-BLAN–0088.
. P.I.: Prof. Bart van Tiggelen and Prof. Geert Rikken.
. Contract duration and budget: 2009-2013, 275.000 euro.
. Participation: *Chercheur associé*.

C.4. Patents

Traveling Wave Enantio-selelective Electron Paramagnetic Resonance (TWEEPR), in collaboration with Prof. Geert Rikken, Director of the *Laboratoire National des Champs Magnétiques Intenses* (LNCMI), CNRS (status: in process).

C.5, C.6, C.7(e. g., Institutional responsibilities, memberships of scientific societies…)

. Referee of international journals: Journal of Applied Physics, European Physics Letters, Journal of Physics: Condensed Matter, Physical Review A, Physical Review Research, Physical Review Letters, Journal of Physics A: Mathematics and General, Atoms – MDPI, Symmetry –MDPI, etc.

. Co-editor of Special Issue *Symmetry breaking in quantum phenomena* in Journal *Symmetry,* MDPI Ed. (Open Access).

. Review Editor in Plasmonics (specialty section of Frontiers in Photonics).