Part A. Personal Information

DATE	February 2020

Surname(s)	Hernández Vozmediano	
Forename	María Ángeles	
Social Security, Passport, ID number	50281775A	
Sex	W	
Age	66	
Researcher codes	WoS Researcher ID *(*)*	A-1391-2009
	SCOPUS Author ID*(*)*	
	Open Researcher and Contributor ID (ORCID)	0000-0003-2574-2310

(*) At least one of these is mandatory

A.1. Current position

Post/ Professional Category	Senior researcher	
UNESCO Code	2211.10, 2211.11	
Key Words	Graphene, Dirac fermions, topological matter	
Name of the University/Institution		
	Department/Centre	ICMM
	Full Address	Sor Juana Inés de la Cruz 3, 28049 Madrid
	Email Address	
	Phone Number	
Start date		

A.2. Education *(title, institution, date)*

Year	*University*	*Degree*	*Title*
1975	*Complutense Madrid*	*First degree*	*BA in Physics*
		Masters (if appropriate)	
1983	*Autónoma Madrid*	*PhD*	

A.3. Indicators of Quality in Scientific Production *(See the instructions)*

- 6 research "sexenios". Date of last reconized: 2016
- 8 PhD thesis. One more on-going. All students remain in academia.
- Total publications WOS: 96
- Sum of times cited WOS 5,026
- Average citations per item: WOS 52.35
- h number WOS =34
- Total number of articles in first quartile: 80

Part B. Free Summary of CV *(Max. of 3.500 characters, including spaces)*

Teaching experience: 5 "quinquenios" recognized by the Ministery as University teacher and numerous PhD courses, outreach seminars, student supervision of the JAE_INTRO call. Research Professor at CSIC since January 2018. Research Professor in the 2016 call. The remaining years I was teaching at the University.

Research trajectory:

After the synthesis of graphene and the materials described by the Dirac equation, the actual modeling of novel materials is fed with concepts and techniques traditionally belonging to high energy physics. In turn, the last years have seen the use of condensed matter system as laboratories to test superstrings and cosmological models. My PhD education was in the

field of quantum field theory in elementary particles (PhD thesis at the Weizmann Institute in Israel) and later I worked on cosmology and superstrings (two years Postdoctoral stay in the Group of E. Witten in Princeton). In the 90' I started to work on modelling fullerenes and graphene. My previous experience allowed me to use techniques of quantum field theory (renormalization Group, Feynman graphs, functional integrals) to the study of correlated electron Systems, graphene and the novel topological materials. Specially relevant results from the 90's are the following: 1. Theoretical prediction of the Fermi velocity renormalization of graphene [1] which was experimentally confirmed in the Group lead by the Nobel Prize winners twenty years later. 2. Modelling lattice deformations in graphene as gauge fields was suggested in 1997 in the fullerene context [2] and is being widely used in present days as a standard technique for crystalline two dimensional materials. More recently and as future projection I have been the advisor of several PhD thesis on graphene and topological insulators using methods of cosmology and effective actions. Of special interests is the article published in Nature Physics [3] where all my co-authors were Spanish theoreticians without permanent position.
I worked on graphene prior to the Nobel recognition (I was invited to the Nobel simposium in 2010) and I have conducted two PhD thesis on topological matter prior to the Nobel recognition in 2016. Same with topological matter. At the present I keep active collaborations with high energy Physics groups, particularly with the group of K. Landsteiner especialised on the Anti DeSitter/Conformal Field Theory (ADS/CFT) correspondence which is being used to explore condensed matter systems in the strong coupling regime, and with D. Kharzeev, a prominente author of the "quark-gluon plasma" actual director of the theory group of the Brookhaven National lab. [4]
[1] "Non-Fermi liquid behavior of electrons in the half-filled honeycomb lattice. A Renormalization Group Approach", J. González, F. Guinea y A.H. Vozmediano, Nucl. Phys. B424 (1994) 593.
[2] "Continuum approximation to fullerene molecules", J. González, F. Guinea y A.H. Vozmediano, Phys. Rev. Lett. 69 (1992) 172.
[3] "Aharonov-Bohm interferences from local deformations in graphene", F. de Juan, A. Cortijo, M. A. H. Vozmediano, and A. Cano. Nature Physics 7, 810 (2011).
[4] Strain induced Chiral Magnetic Effect in Weyl semimetals", A. Cortijo, D. Kharzeev, K. Landsteiner and M.A.H. Vozmediano, Phys. Rev. B 94, 241405(R) (2016).

Part C. Relevant accomplishments

C.1. Publications

C.1. Publicaciones más relevantes en los últimos 10 años

- Chiral sound waves in strained Weyl semimetals", Maxim Chernodub and María A.H. Vozmediano, Phys. Rev. Res. 1 , 032040(R) (2019).
- "Generation of a Nernst current from the conformal anomaly in Dirac and Weyl semimetals", M. N. Chernodub, A. Cortijo, and M.A.H. Vozmediano,Phys. Rev. Lett. 120, 206601 (2018). Parámetro de impacto de la revista: 7.645.
- "Novel effects of strains in graphene and other two dimensional materials", B. Amorim,. Cortijo, F. de Juan, A. G. Grushin, F. Guinea, A. Gutiérrez-Rubio, H. Ochoa, V. Parente, R. Roldán, P. San-Jose, J. Schiefele, M. Sturla, and M. A. H. Vozmediano, Physics Reports **617** (2016) 154. Parámetro de impacto de la revista: 20.033. 134 citas en 2 años. Review elaborado por los miembros del grupo bajo mi dirección.
- "Elastic Gauge Fields in Weyl Semimetals, A. Cortijo , K. Landsteiner, Y. Ferreiros and M. A. H. Vozmediano, Phys. Rev. Lett. **115**, 177202 (2015). 80 citas.
- "A condensed matter realization of the axial magnetic effect", Maxim N. Chernodub, Alberto Cortijo, Adolfo G. Grushin, K. Landsteiner and M.A.H. Vozmediano, Phys. Rev. **B 89**, 081407**(R),** (2014). A Weyl semimetal work prior to the synthesis of the material.
- "Gauge fields from strain in graphene", F. de Juan, J. L. Mañes, and M. A. H. Vozmediano, Phys. Rev. **B 87**, 165131, (2013). 58 citas.
- "Space dependent Fermi velocity in strained graphene", F. de Juan, M. Sturla, and M. A. H. Vozmediano, Phys. Rev. Lett. **108,** 227205 (2012). 119 citas.
- "Topological Fermi Liquids from Coulomb Interactions in the Doped Honeycomb Lattice, E. V. Castro, A. G. Grushin, A. Cortijo, F. de Juan, B. Valenzuela and M.A.H. Vozmediano, Phys. Rev. Lett. **107**, 106402 (2011).

- "Renormalization group aspects of graphene", M.A.H. Vozmediano, PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A-MATHEMATICAL PHYSICAL AND ENGINEERING SCIENCES **369,** 2625 (2011).
- "Gauge fields in graphene", M. A. H. Vozmediano, F. Guinea and M. I. Katsnelson, Physics Reports **496**, 109-148 (2010). Parámetro de impacto de la revista: 20.033, 640 citas.

C.2. Research Projects and Grants

"Anomalies and transport in Dirac crystals" PIC2016FR6. PI: Karl Landsteiner. Budget: 10.000 euros.
"Propiedades fundamentales y aplicaciones del grafeno y otros materiales bidimensionales", CAM, S2013/MIT-3007. Coordinator: M. P. López-Sancho Budget: 872.200 euros.
" Graphene-based revolutions in ICT and beyond". European Union Seventh Framework Programme under grant agreement n°604391 Graphene Flagship." Budget: 1,172.913 euros.
"Models for new materials", CSIC 2012-2014. CICYT, FIS2014-57432-P , PI: M. A. H. Vozmediano. Budget: 100.000,00 euros.
"Aspectos de la teoría de campos en nuevos sistemas de la materia condensada" CSIC 2018-2021. Financiado por la CICYT. PGC2018-099199-B-I00 Investigadora principal: B. Valenzuela y M. A. H. Vozmediano. Presupuesto: 30.000 euros.
"NUEVOSMATERIALESBIDIMENSIONALES:CARACTERIZACIÓN,PROPIEDADES Y APLICACIONES" CSIC 2018-2021. P2018/NMT4511. Financiado por la Comunidad Autónoma de Madrid. Coordinador: Francisco Guinea López. Presupuesto: 783.525 euros.

C.3. Contracts

C.4. Patents and other IPR

C.5, C.6, C.7… Other

Teaching activity in PhD programs 2012-2016
2014-2015: ``Dirac fermions in QFT and in Condensed Matter", Mini course in the Master Program of de Instituto Superior Técnico, Universidad de Lisboa, December 2014. 6 hours.
2014-2015: ``Dirac fermions in QFT and in Condensed Matter", Mini course in the Master Program of de Instituto Superior Técnico, Universidad de Lisboa, December 2014. 6 hours.
Universita' di Napoli "Federico II", Dottorato in Fisica Fondamentale ed Applicata, the PhD course: General relativity and graphene. May 2017. 6 hours.

PhD thesis
1. "Sistemas de electrones correlacionados en torno a singularidades de Van Hove", José Vicente Álvarez Carrera, Universidad Carlos III de Madrid. **July 1997**.(Co-advisor). Currently he has a permanent position at the Universidad Autónoma de Madrid.
2. "Strongly correlated electrons in low dimensional systems", Belén Valenzuela Requena, Universidad Carlos III de Madrid, PhD program on "Mathematical Engineering" with "mención de calidad", **December 2002**. Currently she has a permanent position at the ICMM-CSIC.
3. "Electronic properties of graphene: Influence of topological disorder and interactions", Alberto Cortijo Fernández, Universidad Carlos III de Madrid, PhD program on "Mathematical Engineering" with "mención de calidad", **December 2007**. He gained a Ramon y Vajal contract of the Ministry of Education in the 2018 call.
4. "The influence of morphology and long range interactions on the electronic prop- erties of graphene", Fernando de Juan Sanz, Becario JAE-CSIC, Universidad Autónoma de Madrid, PhD program with "mención de calidad" in the Campus de Excelencia UAM, doctor europeo, defense: **May 2010.** He held postdoc positions at Indiana, Berkeley anf Oxford Universities. Currently he has an Ikerbasque position in DIPC.
5. "Topology and interactions effects in Dirac quasiparticle systems", Adolfo González Grushin, Becario FPI, Universidad Autónoma de Madrid, **February 2013**. PhD program with "mención de calidad" in the Campus de Excelencia UAM, doctor europeo. Premio extraordinario de doctorado UAM 2013. Currently he is a Marie Curie postdoctoral fellow at the University of Berkeley (USA) since September 2015. He gained a permanent position at CNRS in Grenoble in 2017.
6. "Emergent gauge fields and topological effects in Dirac matter", Yago Ferreirós, Universidad Autónoma de Madrid, Becario FP, defense: **September 2016**. PhD program with "mención de calidad" in the Campus de Excelencia UAM, doctor europeo. He was a postdoctoral fellow at Nordita Institute,

University of Stockholm. Currently he gained a "Distinguished Researcher" contract from the Madrid Community at IMDEA.

7. "Novel thermoelectric and elastic responses in Dirac matter", Vicente Arjona Romano, Universidad Autónoma de Madrid, PhD program with "mención de calidad" in the Campus de Excelencia UAM, doctor europeo. Calificación de Sobresaliente Cum Laude en **diciembre de 2019.**

8. Óscar Pozo Ocaña. Becario FPU2017. Ongoing. Expected defense: December 2021.

Supervision of students and postdocs

- Emilia da Silva. JAE-INTRO 2011.
- Alfonso Gijón. JAE-INTRO 2013.
- Daniel Muñoz Segovia. JAE-INTRO 2017.
- Anderson Lima. PhD student from Brasil. Stay of three months Sept. Dec. 2014.

Supervision of postdocs

- Mauricio Sturla. Postdoctoral fellow from Argentina 2012-2014. He gained a permanent position at La Plata (Argentina).
- Jonas da Silva Postdoctoral fellow for one year 2014 with a bilateral project with Brasil bilateral con Brasil. He gained a permanent position at Universidad de Recife, Brasil.
- Raphael de Gail. Contrato Postdoctoral fellow 2014-2016.

Teaching experience

Tenured Assistant professor during 11 years in the Universidad Carlos III de Madrid. Teaching an average of 18 credits per year on Mathematics subjects. Teaching the postgraduate courses:

- 1999-2007: " Quantum Mechanics and Solid State Physics" Postgraduate program on Mathematical. Universidad Carlos III, Madrid. 4 credits.
- "Coulomb interactions and disorder in graphene". The Fourth International Summer School of the DFG-Center for Functional Nanostructures (CFN), August 24 to 27, 2007, Bad Herrenalb (Germany) invited lecturer.
- 2008-2009: "Methods of quantum field theory in condensed matter: graphene physics as an example". Minicourse in the Centro de Física do Porto (Portugal), October 2008.
- 2009-2010: "Renormalization Group Methods in graphene". Minicourse in the Universidad Federal de Paraiba, (Brasil), January 2010.
- 2016-2017: "General relativity and graphene", Dipartimento di Fisica "Ettore Pancini" dell'Università di Napoli "Federico II", Dottorato di Ricerca in Fisica, 6 hours, May 2016.

Managing of workshops and scientific meetings (2014-2020)

• Organizing commitee of the CECAM Workshop on "Graphene's strain engineering: Establishing connections between Condensed Matter Physics, Relativistic Quantum Field Theory, and Computational Mechanics" Zurich, mayo 2014.
• Organizing commitee of the workshop on " Correlations, criticality, and co- herence in quantum systems", Evora, Portugal, 6-10 October 2014.
• Organizing commitee of the workshop on`` Magnetic Fields in Strongly interacting Matter", Utrecht, Holanda, 20-23 November 2015.
• Scientific commitee of the ``Conference on Transport at the Nanoscale", Cuernavaca, Méjico, 25-29 September 2017.
• Organizing Committee of the 7th International Conference on Nanostructures (ICNS7), 27 Feb. - 1 March, 2018, Teheran, Iran.
• Organizing Committee of the workshop on " Weyl Metals", IFT, Madrid, Spain 11-15 February 2019. https://workshops.ift.uam-csic.es/mwwm
• Organizing Committee of the workshop on " Space? Time? (Weyl-)Matter!", IFT, Madrid, Spain 14-16 September 2020.

Management of scientific activities

- Associated Editor of Europhysics Letters 2012-2016.
- Referee of Phys. Rev. Lett., Nature, Science, Adv. in Physics, Nanoletters, NJP, etc.
- Project evaluator for ANEP, IKERBASQUE, ERC, Deutsche Forschungsgemeinschaft and other agencies of various European countries.
- Advisor for TWAS the academy of sciences for the developing world, Ucranian Academy of Science
- Member of the Scientific Council of LE STUDIUM Loire Valley Institute for Advanced Studies. March 2017
- IP of the group "Field theories for condensed matter" of ICMM-CSIC.

Outridge activity

- Popular article in the Spanish version of Scientific American, 2012. “Constantes que corren”, M.A.H. Vozmediano, Investigación y Ciencia , (2012).
- Colloquium in the paraninfo of the Universidad de Salamanca: “Graphene as a bridge between high and low energy physics”, Salamanca, November (2011).
- Chapter "Qué es el grafeno y por qué nos importa" in the popular book “Ciencia y además lo entiendo”.