



## CURRICULUM VITAE (CVA)

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

### Part A. PERSONAL INFORMATION

CV date

10/01/2024

First name	Isabel		
Family name	Guillamón Gómez		
Gender (*)	Female	Birth date (dd/mm/yyyy)	23/05/1981
Social Security, Passport, ID number	48423504-V		
e-mail	<a href="mailto:Isabel.guillamon@uam.es">Isabel.guillamon@uam.es</a>	URL Web	
Open Research and Contributor ID (ORCID)(*)		Orcid <a href="https://orcid.org/0000-0002-2606-3355">0000-0002-2606-3355</a> WoS <a href="https://www.scopus.com/authors/details/authorsID?cid=23993681200">C-9744-2014</a> Scopus <a href="https://www.scopus.com/authors/details/authorsID?cid=23993681200">23993681200</a> <a href="https://scholar.google.com/citations?user=Isabel.guillamon">Google Scholar</a>	

(\*) Mandatory

### A.1. Current position

Position	Assistant Professor (Profesora Titular)		
Initial date	31/10/2022		
Institution	Universidad Autónoma de Madrid		
Departament/Center	Dpto Física de la Materia Condensada/ Facultad de Ciencias		
Country	Spain	Teleph. number	91 497 3757
Key words	Scanning tunneling microscopy, quantum oscillations, low temperature physics, high magnetic fields, superconductivity		

### A.2. Previous positions (research activity interruptions, art. 45.2.c))

Period	Position/Institution/Country/Interruption cause
2020-2022	Profesora Contratada Doctora/ UAM/Spain
2016-2020	RyC Researcher/Universidad Autónoma de Madrid/Spain
2015-2016	Axa Fellow/ Universidad Autónoma de Madrid/Spain
2013-2015	Postdoctoral Researcher/ Universidad Autónoma de Madrid/Spain
2010-2013	Marie Curie Fellow/University of Bristol/UK
2009-2010	Postdoctoral Researcher/ Universidad Autónoma de Madrid/Spain

### A.3. Education

PhD, Licensed, Graduate	University/Country	Year
Physics Degree	Universidad de Murcia	2004
PhD	Universidad Autónoma de Madrid	2009

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

My research aims at facing major challenges in superconductivity. My main motivation is to bring experiments to the optimum performance and obtain thus new significant insight. I have developed

several experiments, such as dilution refrigeration scanning tunneling microscopies for high magnetic fields, new magnetic field probes and grown single crystals in difficult compounds. I have obtained results of relevance for fundamentals of superconductivity, current carrying phenomena, 2D systems and electron correlations.

In vortex physics, I have made images of thousands of vortices in a superconductor, transforming the way we understand superconductors at high magnetic fields, and showing that we can get precise information about vortex positions and their interaction with the superconducting material. I have made several important contributions to the field of unconventional superconductivity showing how electronic correlations influence  $T_c$ , gap anisotropy and vortex lattice in the new Fe-based superconductors. I have studied the coexistence of superconductivity with other electronic and magnetic order and obtained new insight on how this coexistence modifies the superconducting properties.

I studied in Murcia, obtaining the highest qualifications and made my PhD at UAM. In 2010 I joined the University of Bristol for 3 years with grants from MINECO, Royal Society and Marie Curie. In 2011 she made a 2-month stay at Stanford University and experiments in high magnetic field facilities. In 2013, I moved to UAM. I received a postdoctoral fellowship from the AXA Foundation, a MC Integration Grant and a FBBVA project.

In 2015 I obtained a RyC contract and an ERC Starting Grant project that allowed me to lead a research line on scanning tunneling microscopy studies of the normal phase of iron-based superconductors under intense magnetic fields. I use advanced tools such as tunneling microscopy (STM) and quantum oscillations (QO), which require very low temperatures (mK) and high magnetic fields. I have set-up a new laboratory, optimized for measurements of low mechanical noise. I lead the design and construction of STMs to operate up to 22 T in superconducting coils and above 30 T in high field installations. Since 2020, I have a permanent position as assistant professor (first as Contratado Doctor and since 2021 as Profesor Titular de Universidad).

I have more than 65 publications in international journals including 1 Nature, 3 Nat. Phys., 2 Nat. Comms, 5 PRL, 16 PRB, 5 PRR (>1500 citations, h-index=22), and more than 30 invited talks in international conferences. I received the Science European Prize [Nicholas Kurti 2015](#) and [Miguel Catalán 2020 Award for researchers below 40 years](#). I have been IP of 9 projects (4 EU and 5 National projects). I co-directed 6 PhD thesis and am currently director of another 4 PhD thesis and supervisor of 1 postdocs. I am also active in promoting gender equilibrium (<https://goo.gl/9MY71g>) and dissemination (for instance I have made a video documentary about Condensed Matter Physics in [Spanish](#) and [English](#) funded by APS call for outreach projects). I have been vice-chair in 3 international conferences [[1](#), [2](#), [3](#)], organizer of [NGSCES 2017](#) and [INC Summer School 2019](#) and member of the local organizing Committee in [CMD2020GEFES](#). I am regular referee for various scientific journals including Physical Review (Letters, X, B, Applied), Science Advances, Nature journals (Nat Phys., Nat. Comms., NPJ Quantum Materials). I have been evaluator of projects for the European Commission (ERC StG), Spanish Research Agency, FWO Agency. I have supervised 10 Master thesis and 17 Final year projects.

## Part C. RELEVANT MERITS

### C.1. Publications

1. *Quantum-well states at the surface of a heavy-fermion superconductor*. E. Herrera, I. Guillaumon, V. Barrena, WJ Herrera, JA Galvis, A. Levy Yeyati, J. Rusz, PM Oppeneer, G. Knebel, JP Brison, J. Flouquet, D. Aoki, H. Suderow. [Nature 616, 465–469 \(2023\)](#).  
*First observation and characterization of lateral quantization in a 2D heavy fermion.*
2. *Millikelvin scanning tunneling microscope at 20/22 T with a graphite enabled stick-slip approach and an energy resolution below 8  $\mu$  eV: Application to conductance quantization at 20 T in single atom point contacts of Al and Au and to the charge density wave of 2H-NbSe<sub>2</sub>*. M. Fernández-Lomana, B. Wu, F. Martín-Vega, R. Sánchez-Barquilla, R. Álvarez-Montoya, J.M. Castilla, J. Navarrete, J.R. Marijuan, E. Herrera, H. Suderow and I Guillaumon (AC). [Review of Scientific Instruments 92, 093701 \(2021\)](#).  
*Instrumental paper on the construction and performance of a 22T STM at mK temperatures.*

3. **Anisotropic superconductivity in the spin-vortex antiferromagnetic superconductor  $\text{CaK}(\text{Fe}_{0.95}\text{Ni}_{0.05})_4\text{As}_4$ .** J. Benito-Llorens, E. Herrera, V. Barrena, B. Wu, N. Heinsdorf, V. Borisov, R. Valentí, W.R. Meier, S. Bud'ko, P.C. Canfield, I. Guillamón (AC) and H. Suderow. [Phys. Rev. B \*\*103\*\*, L060506 \(2021\).](#)

*Observation of the Fermi surface reconstruction and gap anisotropy induced in  $\text{CaK}(\text{Fe}_{0.95}\text{Ni}_{0.05})_4\text{As}_4$  by the spin-vortex antiferromagnetic order.*

4. **Huge linear magnetoresistance due to open orbits in  $\gamma\text{-PtBi}_2$ .** B. Wu, V. Barrena, H. Suderow, I. Guillamón (AC). [Physical Review Research \*\*2\*\*, 022042 \(Rapid Communications\) \(2020\).](#)

*Observation of non saturating linear magnetoresistance at one specific angle due to the formation of open orbits in the Fermi Surface of  $\gamma\text{-PtBi}_2$ .*

5. **Linear nonsaturating magnetoresistance in the Nowotny chimney ladder compound  $\text{Ru}_2\text{Sn}_3$ .** B. Wu, V. Barrena, F. Mompeán, M. García-Hernández, H. Suderow, I. Guillamón (AC). [Physical Review B \*\*101\*\*, 205123 \(2020\).](#)

*Observation of linear and non saturating magnetoresistance in  $\text{Ru}_2\text{Sn}_3$  due to small Fermi surface with hot spots.*

6. **Influence of multiband sign-changing superconductivity on vortex cores and vortex pinning in stoichiometric high-Tc  $\text{CaKFe}_4\text{As}_4$ .** A. Fente, A. Correa-Orellana, A. Böhrer, A. Kreyssig, S. Ran, S. Bud'ko, P. Canfield, I. Guillamón, H. Suderow. [Physical Review B \*\*97\*\*, 134501 \(2018\).](#)

*Direct observation of two-gap structure in the superconducting density of states and intrinsic pinning by pair breaking defects.*

7. **Direct visualization of phase separation between superconducting a nematic domains in Co-doped  $\text{Ca}_2\text{Fe}_2\text{As}_2$  close to a first-order phase transition.** A. Fente, W. Meier, T. Kong, V.G. Kogan, S. Bud'ko, P. Canfield, F. Mompeán, M. García-Hernández, C. Munuera, I. Guillamón, H. Suderow. [Physical Review B \*\*97\*\*, 014505 \(2018\).](#) Editors' Suggestion.

*Observation by Scanning tunneling, magnetic force and atomic force microscopies of the coexistence between superconducting and antiferromagnetic domains induced by biaxial pressure.*

8. **Magnetic field dependence of the density of states in the multiband superconductor  $\beta\text{-Bi}_2\text{Pd}$ .** E. Herrera, I. Guillamón, J.A. Galvis, R.F. Luccas, F.J. Mompeán, M. García-Hernández, S. Vieira, J.-P. Brison, H. Suderow. [Phys. Rev. B \*\*92\*\* 054507 \(2015\).](#)

*Characterization of superconducting properties in the multiband superconductor  $\beta\text{-Bi}_2\text{Pd}$ .*

9. **Enhancement of long range correlations in a 2D vortex lattice by incommensurate 1D disorder potential.** I. Guillamón (AC), R. Córdoba, J. Sesé, J.M. De Teresa, M.R. Ibarra, S. Vieira, H. Suderow. [Nature Physics \*\*10\*\*, 851-856 \(2014\).](#)

*Microscopic characterization of the critical behaviour of an order-disorder transition in a 2D vortex lattice induced by a 1D incommensurate disorder potential.*

10. **Quasiparticle mass enhancement close to the quantum critical point in  $\text{BaFe}(\text{As}_{1-x}\text{P}_x)_2$ .** P. Walmsley, C. Putzke, L. Malone, I. Guillamón, A.I. Coldea, D. Vignolles, C. Proust, B. Vignolle, S. Badoux, S. Kasahara, Y. Mizukami, T. Shibauchi, Y. Matsuda, A. Carrington. [Physical Review Letters \*\*110\*\*, 257002 \(2013\).](#)

*Determination of effective mass divergence in  $\text{BaFe}(\text{As}_{1-x}\text{P}_x)_2$  at the optimal doping by means of specific heat and de Haas van Alphen measurements.*

## C.2. Congress

More than 40 oral contributions in national and international conferences (30 invited talks) and 10 poster contributions (3 prizes to the best poster). Some highlighted invited talks:

- **SCES 2022**, Amsterdam (Netherlands), July 2022. "STM at magnetic fields of 20 T: quasiparticle interference and vortex lattices of pnictide superconductors".
- **CMD2020GEFES**, (Online) 31 August-4 September 2020. "Microscopic coexistence of anisotropic superconductivity and spin-vortex antiferromagnetism in Ni-doped  $\text{CaKFe}_4\text{As}_4$ ".
- **Vortex 2019**, Antwerp (Belgium), 20-25 May, 2019. "Modifications in the superconducting gap and vortex lattice induced by the coexistence of superconductivity with charge and magnetic order".

- **International Conference on Multi-Condensate Superconductivity and Superfluidity in Solids and Ultra-Cold Gases**, Trieste (Italy), 14-18 May, 2018. “*Quasiparticle interference and vortex lattice imaging in pnictide superconductors*”.
- **APS March Meeting 2018**, Los Angeles (US), 5-9 March, 2018. “*Quasiparticle interference imaging in pure and Ni-doped CaFe<sub>4</sub>As<sub>4</sub> and in related systems*”.
- **LT28**, Gothenburg (Sweden), 6-9 August 2017. “*Direct observation of coexisting nematic and superconducting domains in the Ca<sub>122</sub> pnictide superconductor under strain*”.
- **SWM16**, Les Diablerets (Switzerland), 6-8 July. “*Scanning tunneling microscopy of the superconducting vortex lattice*”.
- **EUCAS 2015**, Lyon (France), 6-10 September, 2015. “*STM of the 2D vortex lattice at very low temperatures*”.
- **E-MRS Fall Meeting 2014**, Warsaw (Poland), 15-18 September, 2014. “*Imaging the superconducting vortex lattice in nanostructured superconductors*”.
- **VIII Reunión del Grupo Especializado de Física del Estado Sólido**, Ciudad Real, 22-24 January, 2014. “*Damping of quantum oscillations in the superconducting state of the two-band superconductor MgB<sub>2</sub>*”.

### C.3. Research projects

1. *Scanning probe microscopy in high vectorial magnetic fields: New device for imaging quantum materials*. ERC Proof of Concept (ERC-PoC-101069239). 2022-2024. 150 000 €. IP: I. Guillamón
2. *Retos y oportunidades de las tecnologías superconductoras en la aviación comercial sin emisiones de gases (SuperZero-e)*. Grant by the Spanish Research Agency (TED2021-130546B-I00). 2022-2024. 276 000 €. IP: I. Guillamón, H. Suderow.
3. *Low temperature scanning microscopies in vectorial magnetic fields*. Proof of Concept Grant by the Spanish Research Agency. 2022- 2023. 103 500 €. IP: I. Guillamón, H. Suderow.
4. *New superconductors for quantum technologies: visualizing and manipulating triplet correlations*. National Grant by the Spanish Research Agency. January 2021-December 2023. 314 600 €. IP: I. Guillamón, H. Suderow.
5. *Integrating devices in the nanoscale microscopy to visualize quantum materials under control*. National Grant by the Spanish Research Agency. January 2018-December 2020. 329 120 €. IP: I. Guillamón, H. Suderow.
6. *Using extreme magnetic field microscopy to visualize correlated electron materials*. ERC Starting Grant 2015. 2016-2022. 1.7 M€. IP: I. Guillamón
7. *Science and technology at high magnetic fields*. Interuniversity cooperation UAM-Santander with the US. July 2015 - December 2016. 12.000 €. IP: I. Guillamón (Spain), G. Boebinger (NHMFL, US).
8. *Scanning tunneling microscopy under very high magnetic fields*. Grant from BBVA Foundation. January 2015- December 2015. 40.000 €. IP: I. Guillamón.
9. *New Technologies To Tackle The Risks Of Our Power-Hungry Society: getting Closer To Room Temperature Superconductivity*. AXA Research Fund. Ene 2015- Dic 2016. 120.000 €. IP: I. Guillamón.

This is one among thirty funded projects in 2014 call, the only one in physics.

10. *ExtremeFieldImaging— Scanning Tunneling Microscopy Studies at High Magnetic Fields: Visualizing Pnictide and Heavy Fermion Superconductivity*. European Commission, MC-CIG Career Integration Grant (FP7-PEOPLE-2013-CIG- 618321). Score: 94.4/100. September 2013- August 2017. 100.000 €. IP: I. Guillamón, H. Suderow.
11. *Observación directa de las propiedades individuales y colectivas de vórtices en superconductores mediante espectroscopía túnel de barrido*. Proyecto del Plan Nacional de I+D+i (2012-2014). 234.000 €. IP: H. Suderow.

### C.4. Contracts, technological or transfer merits

- One Patent: Dispositivo posicionador para microscopios operable en entornos criogénicos”, Patent Number: ES2396331B1 (2013). Inventors: H. Suderow, I. Guillamón, A. Buendía, M. Pazos and S. Vieira.