Miguel Moreno Ugeda

Ikerbasque Research Associate at Donostia International Physics Center (DIPC)
Centro de Física de Materiales (UPV-EHU/CSIC)
Manuel de Lardizábal 5, San Sebastián-Donostia, Spain
mmugeda@dipc.org

Education

- **2011**: PhD with Honors in Physics ("Sobresaliente Cum Laude") at the Department of Condensed Matter Physics, Universidad Autónoma de Madrid, Spain.

  Title: "*Low temperature Scanning Tunneling Microscopy and Spectroscopy in UHV conditions: Development of a 4.2K instrument and study of the impact of point defects in graphene-like systems*". Directors: Dr. José María Gómez Rodríguez and Dr. Iván Brihuega Álvarez.

- **2006**: Diploma in Advanced Studies with Honors at the Department of Condensed Matter Physics, Universidad Autónoma de Madrid.

- **2004**: Licenciado (MSc, with honors) in Physics. Specialty in Solid State Physics (Theory), Universidad Autónoma de Madrid.

Professional activity

- Apr. 2018 – present **Ikerbasque Research Associate**, Donostia International Physics Center (DIPC), San Sebastián, Spain.
- Apr. 2017 - Apr. 2018 **Ramón y Cajal fellow**, Centro de Física de Materiales (CFM-UPV/CSIC), San Sebastián, Spain.
- Jun. 2015 – Apr. 2017 **Ikerbasque Research fellow**, CIC Nanogune, San Sebastián, Spain.
- Jan 2012 – May 2015 **Postdoctoral fellow**, Department of Physics, University of California at Berkeley and Lawrence Berkeley National Laboratory, USA.
- Oct. 2008 - Dec. 2011 **Associated researcher**, Department of Condensed Matter Physics, Universidad Autónoma de Madrid, Spain.
- Oct. 04 – Sept. 08 **PhD student (**FPU and FPI Merit Fellow), Department of Condensed Matter Physics, Universidad Autónoma de Madrid, Spain.

Fellowships

- **2016**: Awarded with a Ramón y Cajal fellowship granted by the Spanish Ministry of Economy, Industry and Competitiveness (MINECO).
- **2014**: Awarded with an Ikerbasque research fellowship granted by Ikerbasque Research Foundation.
- **2012**: Awarded with a US postdoctoral fellowship granted by the Department of Energy (DOE) in the Joint Center for Artificial Photosynthesis (LBNL – UC Berkeley).
- **2008**: Awarded with a position of associated researcher at the Universidad Autónoma de Madrid.
- **2005**: Awarded with an undergraduate merit FPU fellowship granted by the Spanish Ministry of Education and Science (MEC).
- **2004**: Awarded with an undergraduate merit FPI fellowship granted by the Comunidad de Madrid.

Publications in peer reviewed journals

(*corresponding author).

1. ***Nano Letters 20, 5111(2020)***
   Visualization of multifractal superconductivity in a two-dimensional transition metal dichalcogenide in the weak disorder regime
   C. Rubio-Verdú, A. M. García-García, H. Ryu, D.-J. Choi, J. Zaldívar, S. Tang, B. Fan, Z.-X. Shen, S.-K. Mo, J. I. Pascual, M.M. Ugeda*****

2. ***Communications Physics 3, 116 (2020)***
   Electronic and magnetic characterization of epitaxial VSe_2 monolayers on superconducting $NbSe_2$
   B S. Kezilebieke, Md N. Huda, Paul Dreher, I. Manninen, Y. Zhou, J. Sainio, R.Mansell, M. M. Ugeda, S.van Dijken, H.-P. Komsa, P. Liljeroth

3. ***Journal of Physical Chemistry C 123, 27802 (2019)***
   Absence of ferromagnetism in VSe_2 caused by its charge density wave
   B Fumega, M. Gobbi, P. Dreher, W. Wan, C. González-Orellana, M. Peña-Díaz, C. Rogero, J. Herrero-Martín, P. Gargiani, M. Ilin, M. M. Ugeda, V. Pardo, S. Blanco-Canosa

4. ***Nature Materials 18, 539 (2019)***
   Stable in harsh environments (news&views)
   M. M. Ugeda*

5. ***Nature Communications 10, 3382 (2019)***
   Identifying substitutional oxygen as a prolific point defect in monolayer transition metal dichalcogenides with experiment and theory
   S. Barja, S. Abramson, B. Schuler, D. Qiu, A. Pulkin, S. Wickenburg, H. Ryu, M. M. Ugeda, C. Kastl, C. Chen, C. Hwang, A. Schwartzberg, S. Aloni, S.-K. Mo, D.Ogletree, M. F. Crommie, O. V. Yazyev, S. G. Louie, J. B. Neaton, A. Weber-Bargioni

6. ***Nano Letters 19, 3027 (2019)***
   Coexistence of elastic modulations in the charge density wave state of 2H-$NbSe_2$
   B. Guster, C. Rubio-Verdú, R. Robles, J. Zaldívar, P. Dreher, M. Pruneda, J. A. Silva-Guillén, D. -J. Choi, J. I. Pascual, M. M. Ugeda*****, P. Ordejón, and E. Canadell

7. ***Physical review B 99, 075431 (2019)***
   Geometry and electronic structure of iridium adsorbed on graphene
   B. A. Barker, A. J. Bradley, M. M. Ugeda, S. Coh, A. Zettl, M. F. Crommie, S. Louie and M. Cohen

8. ***Physical review B 99, 035438 (2019)***
   Strong-coupling charge density wave in a one-dimensional topological metal
   P. Hofmann, M. M. Ugeda, A. Tamtög, A. Ruckhofer, W. E. Ernst, G. Benedek, A. J. M. Galera, A. Strózecka, J. M. Gómez-Rodríguez, E. Rienks, M. Fuglsang Jensen, J. I. Pascual and J. W. Wells

9. ***ACS Nano 12, 11161 (2018)***
   Electronic properties of transferable atomically thin $MoSe_2$/h-BN heterostructures grown on Rh(111)
   M. W. Chen, H. Kim, C. Bernard, M. Pizzochero, J. Zaldívar, J. I. Pascual, M. M. Ugeda, O. V. Yazyev, T. Greber, J. Osterwalder, O. Renault and A. Kis

10. ***Nature Communications 9, 3401 (2018)***
    Observation of Topologically Protected States at Crystalline Phase Boundaries in Single-layer WSe_2
    M. M. Ugeda*****, A. Pulkin, S. Tang, H. Ryu, Q. Wu, Y. Zhang, D. Wong, Z. Pedramrazi, A. Martín, Y. Chen, F. Wang, Z.-X. Shen, S.-K. Mo, O. V. Yazyev and M. F. Crommie

11. ***Communication Physics 1, 15 (2018)***
    Orbital-selective spin excitation of a magnetic porphyrin
    C. Rubio-Verdú, A. Sarasola, D. -J. Choi, Z. Majzik, R. Ebeling, M. R. Calvo, M. M. Ugeda, A. Garcia-Lekue, D. Sánchez-Portal and J. I. Pascual

12. ***Physical Review Letters 120, 167001 (2018)***
Probing magnetic interactions between Cr adatoms on the ß-Bi_2Pd superconductor
D.-J. Choi, C. García, E.Herrera, C. Rubio-Verdú, M. M. Ugeda, Isabel Guillamón, H. Suderow, J. I. Pascual, and N. Lorente

13. ***Nature Physics 13, 683 (2017)***
Quantum spin Hall state in monolayer 1T'-WTe_2
S. Tang, C. Zhang, D.Wong, Z. Pedramrazi, H-Z. Tsai, C. Jia, B. Moritz, M. Claassen, H. Ryu, S. Kahn, J. Jiang, H. Yan, M. Hashimoto, D. Lu, R. Moore, C-C.Hwang, C. Hwang, Z. Hussain, Y. Chen, M. M. Ugeda, Z. Liu, X. Xie, T. Devereaux, M. F. Crommie, S.-K. Mo and Z. X. Shen

14. ***Nature Communications 8, 15175 (2017)***
Mapping the orbital structure of impurity bound states in a superconductor
D.-J. Choi, C. Rubio-Verdú, J. de Bruijckere, M.M. Ugeda, N. Lorente and J.I. Pascual

15. ***Science 352, 437 (2016)***
Atomic-scale control of graphene magnetism using hydrogen atoms
H. González-Herrero, J. M. Gómez-Rodríguez, P. Mallet, M. Moaied, J. J. Palacios, C. Salgado, M. M. Ugeda, J.Y. Veuillen, F. Ynduráin and I. Brihuega

16. ***Nature Chemistry 8, 678 (2016)***
Imaging Single-Molecule Reaction Intermediates Stabilized by Surface Dissipation and Entropy
A. Riss, A. P. Paz, S. Wickenburg, H.-Z. Tsai, D. G. de Oteyza, A. J. Bradley, M. M. Ugeda, P. Gorman, M. F. Crommie, A. Rubio, and F. R. Fischer

17. ***Nature Physics 12, 751 (2016)***
Charge density wave order in 1D mirror twin boundaries of single-layer $MoSe_2$
S. Barja, S. Wickenburg, Z.-F. Liu, Y. Zhang, H. Ryu, M. M. Ugeda, Z. Hussain, Z.-X. Shen, S.-K. Mo, E. Wong, M. B. Salmeron, F. Wang, M. F. Crommie, D. F. Ogletree, J. B. Neaton and A. Weber-Bargioni

18. ***Nature Physics 12, 92 (2016)***
Characterization of collective ground states in single-layer $NbSe_2$
M. M. Ugeda*, A. J. Bradley, Y. Zhang, S. Onishi, Y. Chen, W. Ruan, C. O. Aristizabal, H. Ryu, M. Edmonds, H. Tsai, A. Riss, S.-K. Mo, D. Lee, A. Zettl, Z. Hussain, Z.-X. Shen and M.F. Crommie

19. ***Nano Letters 16, 2485 (2016)***
Electronic Structure, Surface Doping, and Optical Response in Epitaxial WSe_2 Thin Films
Y. Zhang, M. M. Ugeda, C. Jin, S.-F. Shi, A. J. Bradley, A. M.-Recio, H. Ryu, J. Kim, S. Tang, Y. Kim, B. Zhou, C. Hwang, Y. Chen, F. Wang, M. F. Crommie, Z. Hussain, Z.-X. Shen and S.-K. Mo

20. ***ACS Nano 10, 5131 (2016)***
Graphene Tunable Transparency to Tunneling Electrons: A Direct Tool to Measure the Local Coupling
H. González-Herrero, P. Pou, J. Lobo-Checa, D. Fernández-Torre, F. Craes, A. J. Martínez-Galera, M. M. Ugeda, M. Corso, J. E. Ortega, J. M. Gómez-Rodríguez, R. Pérez and I. Brihuega

21. ***Journal of Physical Chemistry C 120, 26445 (2016)***
Covalent Functionalization of GaP(110) Surfaces via a Staudinger-Type Reaction with Perfluorophenyl Azide
M. M. Ugeda*, A. J. Bradley, L. Rodrigo, M. Yu, , P. Doak, W. Liu, P. Doak, A. Riss, J. B. Neaton, T. D. Tilley and M. F. Crommie

22. ***Physica Status Solidi B 253, 2396 (2016)***
Selenium capped monolayer $NbSe_2$ for two-dimensional superconductivity studies
S. Onishi, M. M. Ugeda, Y. Zhang, Y. Chen, C. O. Aristizabal, H. Ryu, S.-K. Mo, Z. Hussain, Z.-X. Shen, M. F. Crommie and A. Zettl

23. ***Nano Letters 15, 2594 (2015)***
Probing the Role of Interlayer Coupling and Coulomb Interactions on Electronic Structure in Few-Layer $MoSe_2$ Nanostructures
A. J. Bradley, M. M. Ugeda*, F. H. da Jornada, D. Y. Qiu, W. Ruan, Y. Zhang, S. Wickenburg, A. Riss, J. Lu, S.-K. Mo, Z. Hussain, Z.-X. Shen, S. G. Louie and M. F. Crommie

24. ***Nature Materials 13, 1091 (2014)***
Giant bandgap renormalization and excitonic effects in a monolayer transition metal dichalcogenide semiconductor
M. M. Ugeda*, A. J. Bradley, S. F Shi, F. H. da Jornada, Y. Zhang, D. Y. Qiu, W. Ruan, S. K. Mo, Z. Hussain, Z.X. Shen, F. Wang, S. G. Louie and M. F. Crommie.

25. ***ACS Nano 8, 5395 (2014)***
Imaging and Tuning Molecular Levels at the Surface of a Gated Graphene Device
A. Riss, S. Wickenburg, L. Z. Tan, H-Z. Tsai, Y. Kim, J. Lu, A. J. Bradley, M. M. Ugeda, K. Meaker, K. Watanabe, T. Taniguchi, A. Zettl, F. R. Fischer, S. G. Louie, and M. F. Crommie

26. ***Nano Letters 14, 2251 (2014)***
Local electronic and chemical structure of oligo-acetylene derivatives formed through radical cyclizations at a surface
A. Riss, S. Wickenburg, P. Gorman, L. Z. Tan, H. Z. Tsai, D. G. de Oteyza, Y-. C. Chen, A. J. Bradley, M. M. Ugeda, G. Etkin, S. G. Louie, F. R. Fischer, and M. F. Crommie

27. ***Journal of Physical Chemistry C 117, 26091 (2013)***
Adsorption and Stability of π-Bonded Ethylene on GaP(110)
M. M. Ugeda*, M. Yu, A. J. Bradley, P. Doak, W. Liu, G. F. Moore, I. D. Sharp, T. D. Tilley, J. B. Neaton, and M. F. Crommie

28. ***Physical Review Letters 109, 196802 (2012)***
Unraveling the intrinsic and robust nature of van Hove singularities in twisted bilayer graphene by scanning tunneling microscopy and theoretical analysis
I. Brihuega, P. Mallet, H. González-Herrero, G. T. Laissardière, M. M. Ugeda, L. Magaud, J. M. Gómez-Rodríguez, F. Ynduráin, and J- .Y. Veuillen

29. ***Physical Review B 86, 045444 (2012)***
Role of pseudospin in quasiparticle interferences in epitaxial graphene probed by high-resolution
P. Mallet, I. Brihuega, S. Bose, M. M. Ugeda, J.M.Gómez-Rodríguez, K. Kern and J. Y. Veuillen

30. ***Physical Review B (Rapid) 85, 121402 (2012)***
Electronic and structural characterization of divacancies in irradiated graphene
M. M. Ugeda*, I. Brihuega, J. M. Gómez-Rodríguez and F. Ynduráin

31. ***Journal of Physical Chemistry C 116, 9568 (2012)***
Adsorption and Growth of 1,3,5-Triazine on Cu(111) at Low Temperature under UHV Conditions
A.J. Martínez-Galera, B. de la Torre, M. M. Ugeda and J. M. Gómez-Rodríguez

32. ***Physical Review B 84, 104525 (2011)***
Experimental observation of thermal fluctuations in single superconducting Pb nanoparticles through tunneling measurements
I. Brihuega, A. M. García-García, P. Ribeiro, M. M. Ugeda, C. H. Michaelis, S. Bose and K. Kern

33. ***Physical Review Letters 107, 116803 (2011)***
Point defects in graphene on metals
M. M. Ugeda, D. Fernández-Torre, P. Pou, I. Brihuega, A.J. Martínez-Galera, R. Pérez, and J. M. Gómez-Rodríguez

34. ***Nature Materials 9, 550 (2010)***
Observation of shell effects in superconducting nanoparticles of Sn
S. Bose, A.M. García-García, M. M. Ugeda, J. Urbina, C. H. Michaelis, I. Brihuega and K. Kern

35. ***Physical Review Letters 104, 096804 (2010)***
Missing atom as a source of carbon magnetism
M. M. Ugeda, I. Brihuega, F. Guinea and J. M. Gómez-Rodríguez

36. ***Physical Review Letters. 102, 096802 (2009)***
Nondegenerate Metallic States on Bi(114): A One-Dimensional Topological Metal
J. W. Wells, J. H. Dil, F. Meier, J. Lobo-Checa, V. N. Petrov, J. Osterwalder, M. M. Ugeda, I. F. Torrente, J. I. Pascual, E. D. Rienks, M. F. Jensen, and Ph. Hofmann.

37. ***Physical Review B 76, 035422 (2007)***
Surface diffusion of Pb single adatoms on the Si(111)-(R3xR3)R30º-Pb system
I. Brihuega, M. M. Ugeda and J.M. Gómez-Rodríguez

38. ***Physical Review Letters 98, 156102 (2007)***
Adatom-Adatom interaction mediated by an underlying surface phase transition
I. Brihuega, A. Cano, M. M. Ugeda, J. J. Sáenz, A. Levanyuk and J.M. Gómez-Rodríguez

39. ***Physical Review B 75, 155411 (2007)***
Defects in the (R3xR3) ⇔ (3x3) phase transition in the Pb/Si(111) system
I. Brihuega, O. Custance, M. M. Ugeda and J. M. Gómez-Rodríguez

40. ***Physical Review Letters 95, 206102 (2005)***
Direct observation of a (3x3) phase in a-Pb/Ge(111) at 10 K
I. Brihuega, O. Custance, M. M. Ugeda, N. Oyabu, S. Morita and J. M. Gómez-Rodríguez

Invited talks at conferences and seminars

1. **HeteroNanoCarb 2019**
Benasque (Spain), December 11th, 2019.
Visualization of multifractal superconductivity in a two-dimensional transition metal dichalcogenide in the weak-disorder regime

2. **35 years of STM in Spain**
Madrid (Spain), October 24th, 2019.
A case for advanced instrumentation

3. **Trends in Nanotechnology (TNT 2019)**
Donostia-San Sebastián (Spain), October 4th, 2019.
Visualization of multifractal superconductivity in a two-dimensional transition metal dichalcogenide in the weak-disorder regime

4. **7th Workshop on 2D Materials (W2DM2019)**
Alicante (Spain), May 23rd, 2019.
Multifractal superconductivity in single-layer $NbSe_2$

5. **ICON-2DMAT 2018**
Melbourne (Australia), December 10th, 2018.
Multifractal superconductivity in single-layer $NbSe_2$

6. **VIII encuentro de física y química de superficies (EFyQS 2018)**
San Luis (Argentina), October 25th, 2018.
Local Probe Characterization of Novel Electronic Phases in 2D Transition Metal Dichalcogenides

7. **New Generation in Strongly Correlated Electrons Systems (NGSCES 2018)**
San Sebastián (Spain), September 6th, 2018.
Multifractal superconductivity in single-layer $NbSe_2$

8. **Seminar – Max Planck Society**
Ringberg (Germany), September 4th, 2018.
Local Probe Characterization of Novel Electronic Phases in 2D Transition Metal Dichalcogenides

9. **Sp^2 network workshop**
   Madrid (Spain), April 11th, 2018.
   Local Probe Characterization of highly correlated 2D materials

10. **Seminar – Aalto University**
    Helsinki (Finland), February 28th, 2018.
    Local Probe Characterization of Novel Electronic Phases in 2D Transition Metal Dichalcogenides

11. **Seminar – CIC nanoGUNE**
    San Sebastián (Spain), February 26th, 2018.
    Local Probe Characterization of Novel Electronic Phases in 2D Transition Metal Dichalcogenides

12. **CECAM Workshop: Superconductivity in atomically thin materials & heterostructures**
    Lugano (Switzerland), November 20th – 23rd, 2017.
    Local Probe Characterization of 2D superconductivity

13. 2**D Materials and Interfaces for Spintronics workshop**
    Barcelona (Spain), October 23rd – 25th, 2017.
    Quantum spin Hall effect in monolayers of transition metal dichalcogenides

14. **Quantalab Workshop 2017**
    Braga (Portugal), August 29th – September 1st, 2017.
    Local Probe Characterization of Novel Electronic Phases in 2D Transition Metal Dichalcogenides

15. **Flatlands Conference 2017**
    Lausanne (Switzerland), September 12th – 13th, 2017.
    Local Probe Characterization of Novel Electronic Phases in 2D Transition Metal Dichalcogenides

16. **31st International Winterschool on Electronic Properties of Novel Materials (IWEPNM)**
    Kirchberg in Tirol (Austria), March 8th, 2017.
    Characterization of Collective Ground States in Single-layer $NbSe_2$

17. **RTG - Quantum Material modelling workshop**
    Bremen (Germany), March 1st, 2017.
    Interaction effects in 2D materials

18. **Seminar – École Polytechnique Federale de Lausanne (EPFL)**
    Lausanne (Switzerland), December 16th, 2016.
    Low dimensionality effects in single layers of transition metal dichalcogenides

19. **WE-Heraeus-Workshop: Trends in Mesoscopic Superconductivity**
    Bad Honnef (Germany), November 15th, 2016.
    Characterization of Collective Ground States in Single-layer $NbSe_2$

20. **AVS 63rd International Symposium & Exhibition**
    Nashville (USA), November 10th, 2016.
    Characterization of Collective Ground States in Single-layer $NbSe_2$

21. **European Materials Research Society Spring Meeting (e-MRS)**
    Lille (France), May 6th, 2016.
    Scanning tunneling characterization of transition metal dichalcogenides

22. **Seminar - Institute of Physics of the Czech Academy of Sciences**
    Prague (Czech Republic), March 14th, 2016.
    Low dimensionality effects in single layers of transition metal dichalcogenides

23. **DPG Spring Meeting**
    Regensburg (Germany), March 9th, 2016.
    Probing bandgap renormalization, excitonic effects, and interlayer coupling in 2D transition metal dichalcogenides semiconductors

24. **New Trends in 2D materials (Spinograph) workshop**
    Madrid (Spain), February 22nd, 2016.
    Low dimensionality effects in single layers of transition metal dichalcogenides

25. **GEFES meeting**
    Cuenca (Spain), January 15th, 2016.
    Probing bandgap renormalization, excitonic effects, and interlayer coupling in 2D transition metal dichalcogenides semiconductors

26. **III workshop on 2D materials**
    Valencia (Spain), December 3rd, 2015.
    Low dimensionality effects in single layers of transition metal dichalcogenides

27. **International Conference on Nanoscience and Nanotechnology (ICN+T 2014)**
    Vail, Colorado (USA), June 18th, 2014.
    Observation of giant bandgap renormalization and excitonic effects in a monolayer transition metal dichalcogenide semiconductor

28. **European Workshop on Epitaxial Graphene and 2D Materials (EWE $^{G/2D}$ 2014)**
    Primošten, (Croatia), July 25th, 2014.
    Observation of giant bandgap renormalization and excitonic effects in a monolayer transition metal dichalcogenide semiconductor

29. **Seminar - California Institute of Technology, Caltech**
    Pasadena (USA), March 15th, 2013.
    Covalent functionalization of (110) surfaces of III-V semiconductors

30. **Seminar - Physics Department, UC Berkeley**
    Berkeley (USA), July 22nd, 2011.
    Impact of point defects in graphene-like systems

31. **2nd workshop on Nanoelectronics for researchers of the Mediterranean area**
    Alicante (Spain), June 18th, 2010
    Missing atom as a source of carbon magnetism

32. **Seminar - Physics Department, Freie Universität**
    Berlin (Germany), November 6th, 2006.
    Structural and electronic properties of the PTCDA/Cu(111) system at submonolayer coverage by variable temperature scanning tunneling microscopy.

Contributed talks at conferences and seminars

1. Graphene Week 2018
   San Sebastián (Spain), September 10th, 2018.
   Observation of Topologically Protected States at Crystalline Phase Boundaries in Single-layer WSe_2

2. DPG Spring Meeting 2018
   Berlin (Germany), March 15th, 2018.
   Characterization of Collective Ground States in Single-layer $NbSe_2$

3. X Congreso de Fuerzas y Túnel
   Gerona (Spain), September 9th, 2016.
   Characterization of Collective Ground States in Single-layer $NbSe_2$

4. Trends in Nanotechnology (TNT 2015)
   Toulouse (France), September 8th, 2015.
   Probing bandgap renormalization, excitonic effects, and interlayer coupling in 2D transition metal dichalcogenides semiconductors

5. APS March Meeting 2015
   San Antonio (USA), March 5th, 2015.
   Giant bandgap renormalization and excitonic effects in a monolayer transition metal dichalcogenide semiconductor

6. IX Congreso de Fuerzas y Túnel
   San Sebastián (Spain), August 28th, 2014.

Giant bandgap renormalization and excitonic effects in a monolayer transition metal dichalcogenide semiconductor

7. APS March Meeting 2013
   Baltimore (USA), March 19th, 2013.
   Impact of point defects in graphene systems
8. VII Congreso de Fuerzas y Túnel
   Tarragona (Spain), September 28th, 2010.
   Missing atom as a source of carbon magnetism
9. 18th International Vacuum Congress IVC-18
   Beijing (China), August 25th, 2010.
   Missing atom as a source of carbon magnetism
10. Instituto Nicolás Cabrera - Young Researchers Meeting 2009
    Miraflores de la Sierra (Spain), December 11th, 2009.
    Fingerprint of magnetism in atomic vacancies in HOPG

Research stays

Postdoctoral researcher

1. Department of Physics, Crommie group, **University of California at Berkeley**, Berkeley (USA).
   Supervisor: Prof. Michael F. Crommie.
   Duration/Funding: 1 yr. - 8 mo. October 2013 – July 2015. / US Department of Energy (DOE).

2. Joint Center for Artificial Photosynthesis (**Lawrence Berkeley National Laboratory**) and **University of California at Berkeley**, Berkeley (USA).
   Supervisors: Prof. Michael F. Crommie and Prof. Nathan Lewis.
   Duration/Funding: 1 yr. - 9 mo. (January 2012 - September 2013) / US Department of Energy.

PhD Studies

1. Department of Condensed Matter Physics, **Universidad Autónoma de Madrid**, Madrid (Spain).
   Supervisors: Dr. José María Gómez-Rodríguez and Dr. Iván Brihuega Álvarez.
   Position: PhD student.
   Duration/Funding: 6 yr. - 9 mo. (October 2004 - July 2011) / FPU and FPI (CAM) merit fellowships.

Guest researcher

1. **Department of Physics,** University of California at Berkeley (USA).
   Host: Prof. Michael F. Crommie.
   Duration/Funding: 4 weeks (April 2017) / UCB-CIC nanoGUNE

2. **Key Laboratory of Artificial Structures and Quantum Control,** Tsinghua University (China).
   Host: Prof. Qi-Kun Xue
   Duration/Funding: 2 weeks (January 2016) / Tsinghua University

3. **Institute for Storage Ring Facilities** (ASTRID), Aarhus University (Denmark).
   Host: Prof. Philip Hofmann.
   Duration/Funding: 2 weeks (August - September 2009) / Aarhus University.

4. Nanoscale Science Department, **Max Planck Institute for Solid State Research,** Stuttgart, Germany.
   Hosts: Dr. Iván Brihuega and Prof. Klaus Kern.
   Duration/Funding: 14 weeks (May - August 2008) / FPU fellowship.

5. Local Spectroscopy Group, **Freie Universität Berlin**, Germany.
   Host: Prof. J. I. Pascual.
   Duration/Funding: 12 weeks (October - December 2006) / FPU fellowship.

6. Graduate School of Engineering, **Osaka University**, Japan.
   Host: Dr. Óscar Custance and Prof. Seizo Morita.
   Duration/Funding: 3 weeks (September 2006) / Osaka University - Universidad Autónoma de Madrid.
7. Graduate School of Engineering, **Osaka University**, Japan.
   Host: Dr. Óscar Custance and Prof. Seizo Morita.
   Duration/Funding: 1 week (January 2006) / Osaka University.
8. Graduate School of Engineering, **Osaka University**, Japan.
   Hosts: Dr. Óscar Custance and Prof. Seizo Morita.
   Duration/Funding: 4 weeks (August - September 2005) / Osaka University.
   Research: Development of a UHV-low temperature Scanning Tunneling Microscope (LT-STM).

Management in scientific projects

Principal investigator

- 2020 – 2021: "*Magnetism in stable flatlands"*
  Funding source: Departamento de educación, Gobierno Vasco.
  Budget: **49.838 €**

- 2018 – 2023: "*Linking atomic-scale properties of 2D correlated materials with their mesoscopic transport and mechanical response*"
  Funding source: European Research Council – **ERC Starting Grant 2017**
  Budget: **1.734.625 €**
- 2018 – 2021: "*Transistores de spin basados en heteroestructuras de van der Waals*"
  Funding source: Spanish Ministry of Economy, Industry and Competitiveness.
  Budget: **108.900 €**
- 2017 – 2018: "*Correlación entre las propiedades a la escala atómica y el transporte electrónico mesoscópico en materiales bidimensionales altamente correlacionados*"
  Funding source: Spanish Ministry of Economy, Industry and Competitiveness.
  Budget: **68.181 €**
- 2015 – 2017: "*Dispositivos fotovoltaicos y luminiscentes de alta eficiencia basados en heterostructuras hibridas*"
  Funding source: Spanish Ministry of Economy, Industry and Competitiveness.
  Budget: **84.700 €**
- 2015 – 2016: "*Superconductividad a escala nanométrica*"
  Funding source: Diputación Foral de Gipuzkoa
  Budget: **77.000 €**
- 2016 – 2021: *Ramón y Cajal grant*
  Funding source: Spanish Ministry of Economy, Industry and Competitiveness.
  Budget: **40.000 €**
- 2015 – 2020: *Ikerbasque grant*
  Funding source: Ikerbasque Research Foundation
  Budget: **4.000 €**

Synergetic Activities

- **2021**: Organizer of the II International conference on "Novel 2D materials explored via scanning probe microscopy and spectroscopy", Aug. 31st - sept. 3rd, 2021 - San Sebastián (Spain).
- **2018**: Organizer of the International conference on "Novel 2D materials explored via scanning probe microscopy and spectroscopy", June 25th -29th, 2018 - San Sebastián (Spain).
- **2017**: Member of the 2D Materials Focus Topic program committee for the AVS International Symposium & Exhibition (AVS-64) (Oct. 29th - Nov. 3rd, Tampa (FL), USA).
- **2016**: Member of the organizing committee of the European conference on Nanofilms (Oct.19th – 21st, Bilbao (Spain)).
- **2016**: Member of the scientific committee of the EMN Conference on 2D materials (May 12th – 15th, San Sebastián (Spain)).
- **2012**: Co-organizer and member of the scientific committee of the Graphene MURI 2012 workshop (July 26th – 27th 2012, Berkeley, USA).
- **2008**: Member of the technical committee of the VI Fuerzas y Túnel Conference (Sept. 22nd – 25th 2008, Segovia, Spain).

Teaching and mentoring Activities

- **2018** –: Supervisor of 1 PhD thesis (Paul Dreher - ongoing) and postdoctoral fellows (Wen Wan and Rishav Harsh) at the DIPC-CFM.
- **2012** –**2015**: Mentor of 2 PhD students (Aaron Bradley and Kacey Meaker), 1 visiting student (Wei Ruan) and several undergraduate students in the Dept. of Physics at UC Berkeley.
- **2009 – 2011**: 200 hours of academic activity in the Bachelor course "Experimental techniques II" at the Universidad Autónoma de Madrid.

Contributions in advanced instrumentation

Between 2005 and 2011, I successfully developed the first UHV low temperature scanning tunneling microscopy (UHV-LT-STM) instrument in Spain and significantly contributed to the development of the first UHV low temperature non-contact atomic force microscope (UHV-LT-NC-AFM) in Spain. Both instruments are currently operational and remain the only two non-commercial UHV low temperature SPM facilities in Spain.

Development of an UHV-LT-STM: I carried out my own development of a new UHV-LT-STM as the central project of my PhD thesis. The 3-year project comprised the original design, construction, assembly and optimization of the entire system. The instrument has been fully operational since December 2008 at the Universidad Autónoma de Madrid (UAM), Spain.

Development of an UHV-LT-NC-AFM: During my PhD I also participated in the development of a new UHV-LT-NC-AFM. My role throughout the project was to coordinate the implementation of the transferable technology from the original design of the UHV-LT-STM to the new instrument. The extensive expertise and knowledge I gained during the STM project was key for the successful later development of the cryogenic UHV-NC-AFM. Since 2012 the UHV-LT-AFM is fully operational.

Development of a molecular beam epitaxy (MBE) instrument: In 2016 I developed a new MBE capability for the growth of 2D materials and vertical heterostructures in CIC nanoGUNE. Several research groups currently benefit from this instrument that provides Se-based 2D semiconductors, superconductors and topological insulators.

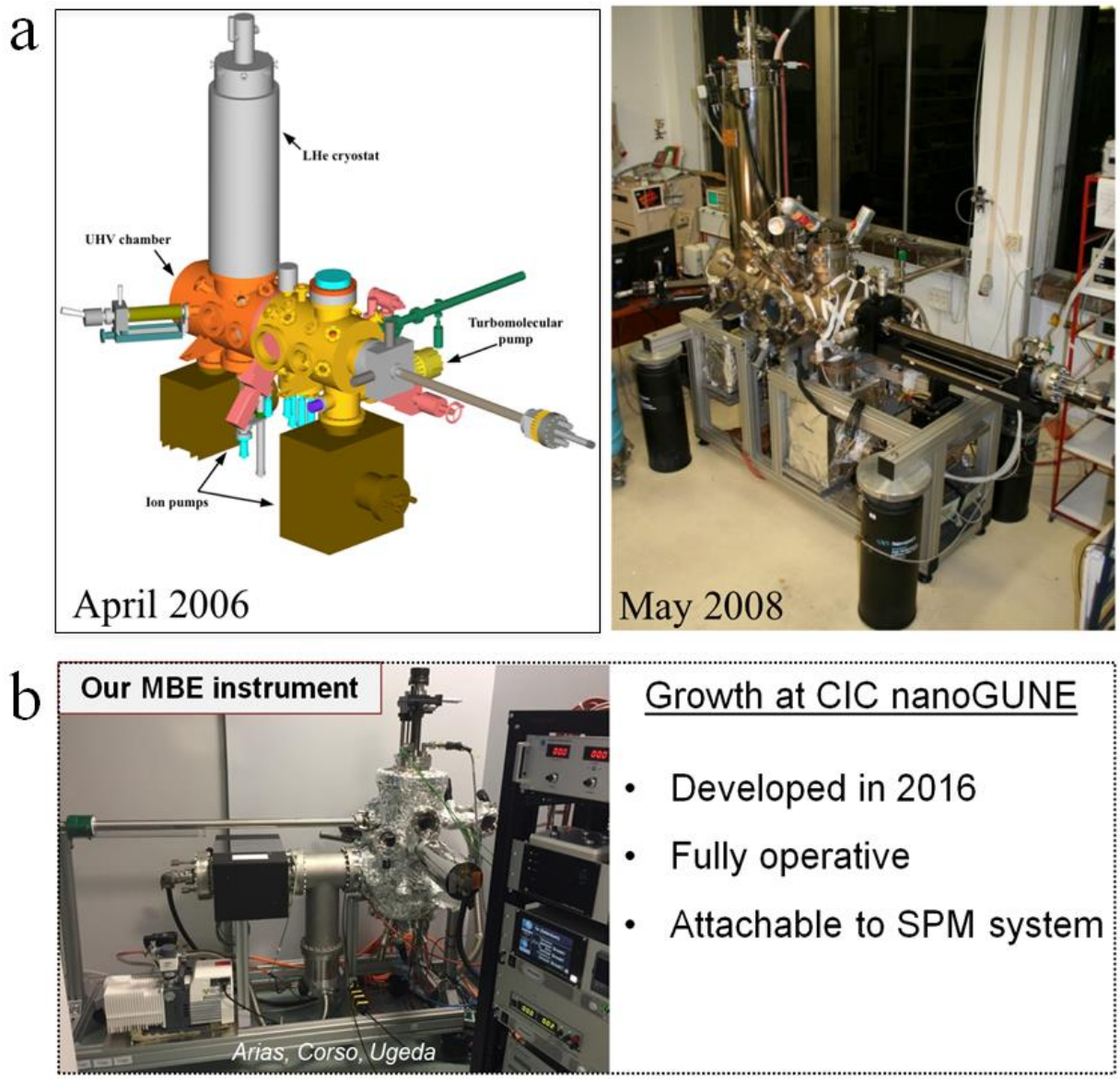

Figure 1: (a) Evolution of the UHV-LT-STM development: 3D Design (Left) and final assembly (Right). (b) MBE instrument developed in 2016.