

JOAQUIN FERNANDEZ-ROSSIER



Born: 2/6/1971 in Santiago de Chile.
Spanish citizen.

Affiliation: Departamento de Física Aplicada,
Universidad de Alicante,
San Vicente del Raspeig 03690, Alicante,
SPAIN

Position: Associate Professor

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Education

Ph. D., Physics (Jan. 1999)

Department of Physics, Universidad Autónoma de Madrid, Spain.

Dissertation: *Collective properties of interacting excitons in semiconductor Quantum Wells*. Thesis advisor: Professor Carlos Tejedor

B. Sc., Physics, Sept. 1994

1st,4th and 5th year in Universidad Autonoma de Madrid, Spain

Second and third year in Universite Libre de Bruxelles, Belgium

Academic Employment

November 2009 -present

Associate Professor (Profesor Titular), Department of Applied Physics, University of Alicante (Spain)

April 2008 –November 2009

Associate Professor (Profesor Contratado Doctor), Department of Applied Physics, University of Alicante (Spain)

March 2003 –March 2008

Assistant Professor, Department of Applied Physics, University of Alicante (Spain)

Sept. 2001 – March 2003

Postdoctoral Fellow in the Physics Department of the University of Texas at Austin, in the group of professor Allan Macdonald

Sept. 1999 – August 2001

Postdoctoral Fellow in the Physics Department of the University of California San Diego, in the group of professor Lu Sham

Feb. 1998 - Sept. 1999

Teaching Assistant in the Science Faculty, Universidad Autonoma de Madrid (UAM)

Jan. 1995 -Feb. 1998

Graduate student at the Dep. of Condensed Matter Theory

Research Experience

Theory of condensed matter physics. (Nanomagnetism. Spintronics and magnetic semiconductors. Graphene. Topological Insulators. Transport in ferromagnetic metals and semiconductors nanostructures. Kondo effect in nanostructures. Spin transfer. Coherent spectroscopy in semiconductors. Bose Condensation, spin polarized interacting excitons.)

Graduated 1 PhD Student and 1 Master Student. Currently supervises 4 PhD students and 1 Postdoctoral researcher.

Teaching Experience

04-05, 05-06, 06-07, 07-08, 08-09, 09-10

Physics 001 for Chemical Engineers, UA.

07-08

Introduction to Magnetism, Master of Molecular Nanoscience, UA.

08-09, 09-10

Solid State Physics, Master of Molecular Nanoscience UA

Sept. 98 - Aug. 99

Teaching Assistant, (*Optics and thermodynamics* Laboratory for Physics undergraduates in their third year), Universidad Autonoma de Madrid

Feb. 98 - Sept. 98

Teaching Assistant, (*Electronic Laboratory* for Physics undergraduates in their fourth year), Universidad Autonoma de Madrid

Organization of Conferences

1. Member of the local and the scientific committee of the second Nanomediterranean Workshop, in Alicante, June 17 and 18. Number of participants: 40
2. Organizer of the Lorentz Center Workshop "Single Dopant Control". March 29 April 1st 2010, Leiden, Netherlands. Number of participants 62.
3. Member of the organizing committee in the 2nd European School of Molecular Electronics, October 25 to 29, 2009, in Benidorm, Spain. Number of participants: >60
4. Member of the Scientific Committee of the First Nanomediterranean Workshop, in Castellón, Spain, June 19 2009. Number of participants: 30
5. Member of the organizing committee of the "II Jornadas de Nanociencia de la Universidad de Alicante", May 15 2008. Number of participants: 30
6. Organizer of the "Primer Encuentro de investigadores del grafeno y nanotubos", Alicante, June 16 2007. Number of participants: 40
7. Member of the local committee in the "IV reunion nacional del Física del Estado Sólido (GEFES)", Alicante, February 1-3, 2006. Number of participants: above 150.

Fellowships and Awards

- RTRA Junior prestigious visitor professor to CNRS/CEA Grenoble (2008-10)
- I3 Award for outstanding researchers, granted by the Spanish Ministry (2007)
- Awarded with 5 year research assistantship by Spanish Government (Program Ramón y Cajal, 2003-2008)
- Post-doctoral Fellowship from the Spanish Ministry of Education (1999, 2 years)
- Predoctoral Fellowship, Fundacion Ramon Areces (1997, 18 months)
- Predoctoral Fellowship, Regional Government of Madrid (1995, 18 months)

Publications

(>900 citations, h=19, as of July 2010)

Regular Articles

(39 in total, 1 Nature, 11 PRL, 24 PRB, 1 APL)

1. C. Le Gall, R. S. Kolodka, C. L. Cao, H. Boukari, H. Mariette, **J. Fernández-Rossier**, and L. Besombes
Optical initialization, readout, and dynamics of a Mn spin in a quantum dot
Phys. Rev. B **81**, 245315 (2010)
2. D. Soriano, F. Muñoz-Rojas, **J. Fernández-Rossier** , J. J. Palacios
Hydrogenated graphene nanoribbons for spintronics
Phys. Rev. B **81**, 16540 (2010)
3. F. Delgado, J. J. Palacios, **J. Fernández-Rossier**
Spin Torque on a single magnetic adatom
Physical Review Letters **104** , 026601 (2010)
4. **J. Fernández-Rossier**
Theory of single spin inelastic tunneling spectroscopy
Physical Review Letters **102**, 256802 (2009)
5. F. Muñoz-Rojas, **J. Fernández-Rossier**, J. J. Palacios
Giant magneto resistance in ultra-small graphene devices
Physical Review Letters **102**, 136810 (2009)
6. R. Calvo, **J. Fernández-Rossier**, J. J. Palacios, D. Jacob, D. Natelson, C. Untiedt
Kondo effect in ferromagnetic nanocontacts
Nature **458**, 1150 (2009)
7. J. van Brie, P. M. Koenraad, **J. Fernández-Rossier**
Single-exciton spectroscopy of single Mn doped InAs quantum dots
Physical Review B **78**, 165414 (2008)
8. L. Besombes, Y Leger, J. Bernos, H. Boukari, H. Mariette, J. P. Poizat, T. Clement, **J. Fernández-Rossier**, R. Aguado
Optical Probing of spin fluctuations of a single paramagnetic Mn atom in a semiconductor quantum dot
Physical Review B **78**, 125324 (2008)
9. J. J. Palacios, **J. Fernández-Rossier**, L. Brey
Vacancy-Induced magnetism in graphene and graphene ribbons
Physical Review B **77**, 195428 (2008)
10. D. Jacob, **J. Fernández-Rossier**, J. J. Palacios
Anistropic magnetoresistance in nanocontacts
Physical Review B **77**, 165412 (2008)
11. **J. Fernández-Rossier**
Prediction of hidden multiferroic order in graphene zigzag ribbons
Phys. Rev. B **77**, 075430, (2008)
12. F. Muñoz-Rojas, **J. Fernández-Rossier**, L. Brey, J. J. Palacios
Performance limits of graphene-ribbon field effect transistors
Phys. Rev. B **B 77**, 045301 (2008)

13. F. Rivadulla, **J. Fernández-Rossier**, M. García-Hernández, M. A. López-Quintela, J. Rivas, J. B. Goodenough
VO: A Strongly Correlated Metal Close to a Mott- Hubbard Transition
Phys. Rev. B **76**, 205110 (2007)
14. **J. Fernández-Rossier**, J. J. Palacios
Magnetism in graphene nano-islands
Phys. Rev. Lett. **99**, 177204 (2007)
15. **J. Fernández-Rossier**, J. J. Palacios, L. Brey
Electronic Structure of gated graphene and graphene ribbons
Phys. Rev. B. **75**, 205441 (2007)
16. **J. Fernández-Rossier** and R. Aguado,
Single Electron Transport in electrically tunable nanomagnets
Phys. Rev. Lett. **98**, 106805 (2007)
17. F. Muñoz-Rojas, D. Jacob, **J. Fernández-Rossier**, J. J. Palacios
Transport in Graphene nanoconstrictions
Physical Review B **74**, 195417 (2006)
18. Y. Léger, L. Besombes, **J. Fernández-Rossier**, L. Maingault, H. Mariette
Electrical Control of a Single Mn atom in a Quantum Dot
Phys. Rev. Lett. **97**, 107401(2006)
19. G. Quinteiro, **J. Fernández-Rossier**, C. Piermarocchi
Long-range spin-Qubit Interaction mediated by microcavity polaritons
Phys. Rev. Lett. **97**, 097410 (2006)
20. D. Jacob, **J. Fernández-Rossier**, J. J. Palacios
Emergence of half-metallicity in suspended NiO chains: Ab-initio electronic structure and quantum transport calculations
Phys. Rev. B **74**, 081402 (2006) (Rapid Communication)
21. **J. Fernández-Rossier**,
Single exciton spectroscopy in semimagnetic quantum dots
Phys. Rev. B **73**, 045301 (2006)
22. G. Chiappe, **J. Fernández-Rossier**, E. Anda, E. Louis
Anisotropic exchange interaction induced by a single photon in a semiconductor microcavity
Physical Review B **72**, 245311 (2005)
23. **J. Fernández-Rossier**, D. Jacob, C. Untiedt, J. J. Palacios
Transport in magnetically ordered Pt nanocontacts
Physical Review B **72**, 224418 (2005)
24. D. Jacob, **J. Fernández-Rossier**, J. J. Palacios
Magnetic and Orbital and blocking in Ni nanocontacts
Phys. Rev. B **71**, 220403 (2005)
25. L. Brey, C. Tejedor, **J. Fernández-Rossier**
Tunnel Magneto-resistance in GaMnAs: going beyond Julliere formula
Applied Physics Letters **85**, 1996 (2004)
26. L. Brey, **J. Fernández-Rossier**, C. Tejedor
Spin depolarization in the transport of holes across GaMnAs/GaAlAs/p-GaAs
Phys. Rev. B **70**, 235334 (2004)

27. **J. Fernández-Rossier**, L. Brey
Ferromagnetism mediated by few electrons in semimagnetic quantum dots
Phys. Rev. Lett. **93**, 1172001 (2004)
28. **J. Fernández-Rossier**, M. Braun, A. S. Núñez, A. H. MacDonald,
Influence of a uniform current on the spin wave spectrum in ferromagnetic metals
Phys. Rev. B. **69**, 174412 (2004)
29. **J. Fernández-Rossier**, C. Piermarocchi, P.C. Chen, L. J. Sham, and A. H. MacDonald,
Theory of Laser induced ferromagnetism
Physical Review Letters **93**, 127201 (2004)
30. **J. Fernández-Rossier** and L. J. Sham
Spin separation in digital ferromagnetic heterostructures,
Phys. Rev. B **66**, 073312 (2002)
31. **J. Fernández-Rossier** and L. J. Sham,
A theory of ferromagnetism in planar heterostructures of (Mn,III)-V semiconductors,
Phys. Rev. B **64**, 235323 (2001)
32. D. Porras, **J. Fernández-Rossier** and C. Tejedor,
Theory of Quantum Mirages in Quantum Corrals,
Phys. Rev. B. **63**, 155406 (2001)
33. D. Porras, **J. Fernández-Rossier** and C. Tejedor,
Fermi-edge singularities in linear and nonlinear ultrafast spectroscopy,
Phys. Rev. B **63**, 245321 (2001)
34. **J. Fernández-Rossier**, S. Haacke and B. Deveaud,
Comment on "Quantum Theory of Secondary Emission in Optically Excited Semiconductor...."
Phys. Rev. Lett. **84**, 2281 (2000)
35. **J. Fernández-Rossier**, C. Tejedor, R. Merlin
Microscopic theory of Coherent Control and Rayleigh Scattering in GaAs Quantum Wells
Semiconductor Science and Technology, Topical Review, **15** R65 (2000)
36. **J. Fernández-Rossier**, C. Tejedor and R. Merlin ,
Exciton Beats in GaAs Quantum Wells: Bosonic Representation and Collective Effects
Solid State Comm. **112**, 597-600 (1999).
37. **J. Fernández-Rossier**, C. Tejedor and R. Merlin,
Coherent light emission from exciton condensates in semiconductor quantum wells
Solid State Communications **108**, 473 (1998)
38. **J. Fernández-Rossier** and C. Tejedor,
Spin degree of freedom in two dimensional exciton condensates,
Physical Review Letters **78**, 4908 (1997)
39. L. Vina, L. Munoz, E. Perez, **J. Fernández-Rossier**, C. Tejedor, K. Ploog
Spin splitting in a polarized quasi-two-dimensional exciton gas.
Physical Review B **54**, R8317 (1996)

40. **J. Fernández-Rossier**, C. Tejedor, L. Munoz and L. Vina
Polarized interacting exciton gas in quantum wells and bulk semiconductors
Physical Review B **54**, 11582 (1996)

Conference papers

1. D. Jacob, **J. Fernández-Rossier**, J. J. Palacios
Electronic structure and transport properties of NiO spinvalves
Journal of Magnetism and Magnetic Materials, **310**, 675 (2007)
2. **J. Fernández-Rossier**, R. Aguado, L. Brey
Anisotropic Magnetoresistance in single electron transport
Phys. Stat. Sol (c) **3**, 4231 (2006)
3. **J. Fernández-Rossier** and R. Aguado
Mn doped II-VI quantum dots: Artificial single molecule magnets
Phys. Stat. Sol (c) **3**, 3734 (2006)
4. Y. Léger, L. Besombes, L. Maingault, **J. Fernández-Rossier**, D. Ferrand and H. Mariette,
Spin properties of charged single Mn-doped quantum dots
Phys. Stat. Sol. (b) **243** 3912-3916 (2006)
5. **J. Fernandez-Rossier**, Alvaro S. Núñez, M. Abolfath, and A. H. MacDonald,
Optical control of the magnetization damping in ferromagnetic semiconductors
Journal of Magnetism and Magnetic Materials **272-276**, 1913 (2004).
6. D. Porrás, **J. Fernandez-Rossier** and C. Tejedor
Fermi-edge singularities in linear and nonlinear ultrafast spectroscopy
Physica E **12**, 558 (2002)
7. **J. Fernandez-Rossier**, C. Tejedor and R. Merlin,
Exciton Coherent Control in semiconductor Quantum Wells
Journal of Physics: Condensed Matter, **11**, 6013 (1999)
8. **J. Fernandez-Rossier** and C. Tejedor,
Condensation of 2D electron-hole pairs with spin degree of freedom
Physica B, **249-251**, 714 (1998).
9. **J. Fernandez-Rossier** and C. Tejedor,
Ferromagnetism in 2D exciton condensates,
Physica Status Solidi **164**, 343 (1997)
10. E. Perez, L. Munoz, L. Vina, **J. Fernandez-Rossier**, C. Tejedor, K. Ploog
Spin Splitting of excitons in GaAs quantum wells at zero magnetic field
Solid State Electronics **40**, 755, (1996)

Conference Proceedings

1. **J. Fernandez-Rossier**, C. Tejedor y R. Merlin,
Exciton Beats and Coherent Control
Technical Digest of QUELS' 99, p106
2. **J. Fernandez-Rossier**, C. Tejedor y R. Merlin,
Coherent Light Emission from Condensed Radiating Exciton,
Proceedings of the ICPS24 (1998), Jerusalem
3. **J. Fernandez-Rossier** and C. Tejedor
Many body effects in the spin polarized exciton liquid in a GaAs Quantum Well,
Proceedings. of the 23 ICPS, vol. 3, p 2463, 1996

Chapters in Books

1. M. Otero-Leal, F. Rivadulla, **J. Fernández-Rossier** and J. Rivas
Inhomogeneous magnetic states in manganites
ISBN 978-81-308-0204-6
2. D. Porrás, **J. Fernandez-Rossier**, C. Tejedor
Exciton and Polariton Condensation in « Quantum Coherence : from quarks to solids », Springer, Heilderberg
Lect. Notes Phys. **689**, 153-189 (2006)
ISBN: 978-3-540-30085-4
3. **J. Fernandez-Rossier**, D. Porrás, C. Tejedor and R. Merlin,
Coherent Response to Optical Pulses in Quantum Wells.
p. 143 in "Optical Properties of Semiconductor Nanostructures", Ed. By M. L. Sadowsky, M. Potemsky and M. Grynberg, Kluwer Academic Publisher, Netherlands 2000. ISBN: 978-0792363170
4. **J. Fernandez-Rossier** and C. Tejedor,
Spin effects in exciton condensation in quantum wells "Physics of Semiconductors" (World Scientific. Singapore. 1999),
p. 121-128.. Edited by David Gershoni
ISBN: 978-9810236137

Talks and Seminars

Invited Talks

1. *Spin Torque transfer on a single atom*, Nordicspin 2010 workshop, Gimo, May 7, 8 2010
2. *Magnetism and Spintronics in graphene nanostructures*, CECAM workshop, Lausanne, October 15th, 2009.
3. *Magnetism in graphene nanostructures*, Asianano 2008, Singapore, 1-4 Nov 2008
4. *Contrôle électrique d'un seul atome magnétique*, RTRA Inauguration workshop, Grenoble, France, 19-9-08
5. *Single Mn doped quantum dots: from CdTe to InAs*. CECAM Workshop, Lyon, France, June 2008
6. *Magnetism in Graphene nanostructures*, Nordic Spin Workshop, Gimo, Sweeden, 22-24 April 2008
7. *Theory of Mn-doped CdTe Quantum Dots*, 13th International Conference of II-VI compounds, Jeju, South Korea, September 12 2007
8. *Optical Properties of Low Dimensional Systems* International Workshop, Ottawa, May 30 2007
9. *Control of a single Mn atom in a quantum dot*, International Workshop of Quantum Dot Spintronics, Bochum, Germany. 6-7 December 2006
Electrical control of a single Mn atom in a QD
10. *Electrically Tunable nanomagnets* 14th European Conference on Mathematics for Industry, Leganés, 14 July 2006
11. *Single exciton and single electron spectroscopy in Mn-doped quantum dots* 4th International Conference of Quantum Dots, Chamonix, May 2006;
12. *Coherently Photoinduced Ferromagnetism in Diluted Magnetic Semiconductors* 9th International Conference of Excitons in Confined Systems, Southampton, September 7 2005
13. *Ferromagnetism mediated by a few electrons in semimagnetic quantum dots* G.E.F.E.S. meeting, San Sebastian, Spain, June 2004
14. 2nd Int. Workshop on Nanophysics and Electronics Lecce, Italy, Nov.98.
Coherent Control of Excitons in Quantum Wells

Other Talks

- 1) Contributed Talk in the 47th Conference on Magnetism and Magnetic Materials, Tampa (FL), Nov. 2002
Current Tuned Spin waves in Ferromagnetic semiconductors
- 2) Contributed Talk at the QUELS conference, Baltimore, USA, May 1999
Coherent Control and Exciton Beats in semiconductor Quantum Well

Invited Seminars

1. *Aislantes Topológicos*
Ciclo de Seminarios del Departamento de Estadística e Investigación Operativa, Universidad de Alicante, May 6 2010
2. *Probing and manipulating the spin of a single atom with non-equilibrium carriers*
Department of Physics, University of Münster, January 14th, 2010
3. *Probing and manipulating the spin of a single atom with tunneling electrons,*
Institute Neel, CNRS, Grenoble, July 7 2009.
4. *Probing the spin of a single atom with tunneling electrons,*
Departamento de Física Teórica de la Materia Condensada, Universidad Autónoma de Madrid, April 15 2009.
5. "Séminaire Nanoélectronique Quantique" in Neel Institute, CNRS Grenoble, September 16, 2008
Magnetism and spintronics in graphene nanostructures
6. Seminar in EPFL , Lausanne, March 28 2008
Magnetism in graphene nanostructures
7. Seminar in Neel Institute, Grenoble, March 26 2008
Single Mn doped QD: from CdTe to InAs
8. Seminar in TU Eindhoven, Nov 2007
Single Mn doped QD: from CdTe to InAs
9. Seminar in Physics Department, Hambourg, Oct 2007
Control of a single magnetic atom in a Quantum Dots
10. NSEC Seminar in Columbia University , June 2007
Graphene Ribbons: electronic structure and transport
11. Seminario Alternativo ICMN, Madrid, 14 June 2006
Electrically Tunable nanomagnets
12. *Tunable Nanomagnets*
Seminar at CEA, Grenoble, October 21 2005
13. *Tunable Nanomagnets*
Seminar at the Department of Physics University of California San Diego, August 17 2005
14. Seminar Lorenz Institute, Leiden University, June 3th 2005
Optical and electrical control of a few spins in semimagnetic nanocrystals
15. Nanoscience Seminar, Delft University, June 1th 2005
Electrically Tunable Nanomagnets
16. Seminar in the Department of Physics of University of Texas A&M, Dec 2002
Laser control of diluted magnetic semiconductors

17. Seminar in the Applied Physics Department of University of Alicante (Spain), Dec. 2001
Heteroestructuras de materiales semiconductores ferromagneticos
18. Seminar in the Department of Physics of UCSB, April 27, 2001
Ferromagnetism in GaAsMn
Seminar in the Cavendish Laboratory, University of Cambridge, England, April 2001 *Ferromagnetism in GaAsMn*
19. Seminar in the Department of Physics, University of Texas at Austin, May 2001. *Tayloring the spin interactions in artificial structures*
20. Seminar in the Department of Physics, Technical University of Eindhoven, Netherlands, April 2001 *Ferromagnetism in GaAsMn heterostructures*
21. Colloquium in California State University Los Angeles, May 18, 2000
Coherent Control in Semiconductors
22. Seminar in the Ecole Polytechnique Federale de Lausanne, Switzerland, December, 18 1998
Coherent Control and Rayleigh Scattering in exciton Quantum Wells

SHORT STAYS

- Institute Neel, CNRS, Grenoble, France. 5 days in July 2009
- Institute Neel, CNRS, Grenoble, France. 5 days in September 2008
- Institute Neel, CNRS, Grenoble, France. 10 days in March 2008
- Department of Physics, University of California San Diego, 4 weeks in August 2005
- Department of Physics, University of California San Diego, 2 weeks in July 2002
- Department of Physics, University of California San Diego, 2 weeks in March-April 2002
- Department of Physics, University of Michigan, Ann Arbor, USA, May 1999
- Ecole Polytechnique Federale de Lausanne, Switzerland, December 1998

Other Merits and skills

- Referee of Nature Materials, Nature Physics, Physical Review Letters, Physical Review B, Journal of Chemical Physics, Solid State Communications and Physics Letters A.
- Member of the *American Physical Society*
- Fluent in reading, writing and speaking English. Fluent in reading and speaking French

Funding (as IP)

1. Funding Agency: Ministerio de Ciencia y Tecnología (Spain)
IP: Joaquín Fernández-Rossier
Period: 2011-2013
Amount: 186k€
Research Project: "New Generation Nanoelectronics"
Number of participants: 9
Reference: :FIS2010-21883-C02-01
2. Funding Agency: Ministerio de Ciencia y Tecnología (Spain)
IP: Joaquín Fernández-Rossier
Period: 2009-2010
Amount: 120k€
Research Project: "*One dimensional nanostructures*"
Number of participants: 8
Reference: MAT07-67845
3. Funding Agency: Ministerio de Ciencia y Tecnología (Spain)
IP: Joaquín Fernández-Rossier
Period: 2003-2008
Amount: 161k€
Research Project: "*Current driven nanomagnets*"
Number of participants: 1
Reference: 3282/02
4. Funding Agency: Generalitat Valenciana (Spain)
IP: Joaquín Fernández-Rossier
Period: 2005-2006
Amount: 20k€
Research Project: "*Nanocrystals*"
Number of participants: 3
Reference:GV05-152

References

For further reference, contact any of the following:

1. Professor Allan MacDonald, Department of Physics, University of Texas at Austin, Austin, TX78712, US
Email: macd@physics.utexas.edu, phone:1- 512 232 9113
2. Professor H. Mariette, CNRS-CEA Nanophysics group, Grenoble, CEA/DRFMC/SP2M, 17, rue des Martyrs Fr-38054 Grenoble
Email : henri.mariette@cea.fr, phone: + 33 (0)4 38 78 56 88
3. Professor Roberto Merlin, Department of Physics, University of Michigan, 500 East University Street University of Michigan Ann Arbor, MI 48109-1120
Email: merlin@umich.edu, phone: 1-734 763-9759
4. Professor Carlos Tejedor, Department of Condensed Matter Theory, Universidad Autonoma de Madrid, Cantoblanco 28049 Spain.
Email: carlos.tejedor@uam.es , phone: 34- 91 397 4908
5. Professor Lu Sham, Department of Physics, University of California San Diego, 9500 Gilman Drive, La Jolla, 92093 CA, US
Email: lsham@physics.ucsd.edu, phone 1-858 534 3269