

CURRICULUM VITAE

Dr. Mirko Rocci

November 2019



PERSONAL INFORMATION

Gender

Nationality:

Date of birth:

Place of birth:

Marital Status:

Phone Numbers:

Address:

Institutional e-mail addresses:

Personal e-mail address:

Website:

 ORCID:

CURRENT POSITION

From 11/2018

Marie Curie Fellow at:

- **Massachusetts Institute of Technology** – Cambridge (US).
(Outgoing phase, 1st year)

Group Leader/Supervisor: Dr. Jagadeesh Moodera

- **NEST – CNR - Scuola Normale Superiore**, Pisa (Italy).
(Return phase, 2nd year)

Group Leader/Supervisor: Dr. Francesco Giazotto



FIELDS OF INTEREST

Nanoscience – Nanotechnology – Experimental Quantum Technology.

Superconducting Spintronics, Nanoelectronics, III-V Semiconductor Nanowires, 2-D Materials, Graphene, LTS and HTS Superconductors, Magnetic Tunnel Junctions, Complex Oxide Nanostructures, Hybrid Nanodevices.

EDUCATION

2009 – 2016

Institution: Campus of International Excellence “Moncloa” (Spain)

Universities: Universidad Complutense de Madrid and Universidad Politécnica de Madrid (Spain)

Thesis Title: “Proximity effects in Complex Oxide nanostructures”

Major: Ph.D. in Condensed Matter Physics

Final Mark: Sobresaliente *Cum Laude*

Advisors: Prof. Zouhair Sefrioui, Prof. Jacobo Santamaría

2006 – 2009

University: Università degli Studi dell’Aquila (Italy)

Major: Master’s Degree in Physics

Final Mark: 110/110

Dissertation Title: “Interplay between ferromagnetism and superconductivity in complex oxide interfaces”

Advisors: Prof. Franco Lucari, Prof. Jacobo Santamaría

2002 – 2006

University: Università degli Studi dell’Aquila (Italy)

Major: Bachelor’s Degree in Physics

Final Mark: 107/110

Dissertation Title: “Growth of germanium nanowires. Morphological and structural characterisation”

Advisor: Prof. Maurizio Passacantando

1997 – 2002

High School: Istituto Tecnico Industriale Statale dell’Aquila “Amedeo di Savoia Duca d’Aosta” (Italy)

Major: Industrial Mechanic Technician

Final Mark: 100/100

PREVIOUS POSITIONS

11/2017 – 11/2018

Post-doctoral Associate at Plasma Science of Fusion Center - **Massachusetts Institute of Technology** – Cambridge (US).

Group Leader/Supervisor: Dr. Jagadeesh Moodera

06/2015 – 11/2017

Post-doctoral Associate at **NEST** – Scuola Normale Superiore, Pisa (Italy).

Group Leaders/Supervisors: Prof. Stefano Roddaro, Dr. Francesco Rossella.

06/2011 – 06/2015

Ph.D. Fellow at Univesidad Complutense de Madrid and Universidad Politécnica de Madrid (Spain).

07/2009 – 06/2011

Research Assistant at Facultad de Ciencias Fisicas - Univesidad Complutense de Madrid (Spain).

FELLOWSHIPS AND AWARDS

11/2018 – 11/2019

Marie Skłodowska Curie - Global Fellowship (2 years).

Project: “**EuSuper** - “Superconducting Magnetic RAM for Next Generation of Supercomputers”. Budget: 165 kEUR.

Partners: Massachusetts Institute of Technology (US) and NEST – CNR - SNS, Pisa (Italy). Supervisors: Dr. Jagadeesh Moodera and Dr. Francesco Giazotto.

06/2017 – 10/2017

Post-doctoral Fellowship, NEST – Scuola Normale Superiore, Pisa (Italy).

Project: “Quantum Transport in nanoelectronic systems (QUANTRA)”

Principal investigator: Prof. Stefano Roddaro

06/2016 – 06/2017

Post-doctoral Fellowship, NEST – Scuola Normale Superiore, Pisa (Italy).

Project: “Thermoelectricity in nanodevices: harnessing quantum and interaction effects”.

Principal investigator: Prof. Stefano Roddaro

06/2015 – 06/2016

Post-doctoral Fellowship, NEST – Scuola Normale Superiore, Pisa (Italy).

Project: “Ultrafast Thermodynamics at the Nanoscale”.

Principal investigator: Dr. Francesco Rossella

- 06/2011 – 06/2015 **Ph.D. Fellowship**, granted by “Campus of International Excellence – Moncloa” (Spain). International Programme for Attracting Talent (PICATA).
- 01/2008 – 07/2008 **Awarded ERASMUS - Placement Scholarship**, Instituto de Ciencias de Materiales de Madrid – CSIC (Spain).
- 09/2006 – 09/2007 **Awarded ERASMUS European Exchange Program Scholarship**, Facultad de Ciencias Fisicas - Univesidad Complutense de Madrid (Spain).

TEACHING EXPERIENCE

- Spring, 2014 **Graduate Teaching Assistant**, at Facultad de Ciencias Fisicas - Universidad Complutense de Madrid (Spain). **Course:** 1°. **Subject:** Laboratorio de Física General I. **E.C.T.S.:** 2.45. **Hours:** 24.5
- Spring, 2013 **Graduate Teaching Assistant**, at Facultad de Ciencias Fisicas - Universidad Complutense de Madrid (Spain). **Course:** 1°. **Subject:** Laboratorio de Física General I. **E.C.T.S.:** 2.45. **Hours:** 24.5
- Spring, 2012 **Graduate Teaching Assistant**, at Facultad de Ciencias Fisicas - Universidad Complutense de Madrid (Spain). **Course:** 5°. **Subject:** Laboratorio de Electrónica_I. **E.C.T.S.:** 2.45. **Hours:** 24.5

LIST OF INTERNATIONAL PEER-REVIEWED PUBLICATIONS

- [P1]. **Investigation of InAs-based devices for topological applications.**
M. Carrega, S. Guiducci, A. Iorio, L. Bours, E. Strambini, G. Biasiol, **M. Rocci**, V. Zannier, L. Sorba, F. Beltram, S. Roddaro, F. Giazotto, S. Heun.
Spintronics XII **11090**, 110903Z (2019).
- [P2]. **Conductometric Sensing with Individual InAs Nanowires.**
V. Demontis, **M. Rocci**, M. Donarelli, R. Maiti, V. Zannier, F. Beltram, L. Sorba, S. Roddaro, F. Rossella and C. Baratto.
Sensors **19** (13), 2994 (2019).
- [P3]. **Vectorial control of the spin-orbit interaction in suspended InAs nanowires.**
A. Iorio, **M. Rocci**, L. Bours, M. Carrega, V. Zannier, L. Sorba, S. Roddaro, F. Giazotto and E. Strambini.
Nano Letters (2018).
- [P4]. **Suspended InAs nanowire-based devices for thermal conductivity measurements using the 3 ω -method.**
M. Rocci, V. Demontis, D. Prete, D. Ercolani, L. Sorba, F. Beltram, G. Pennelli, S. Roddaro, and F. Rossella
Journal of Materials Engineering and Performance **27** (12), 6299-6305 (2018)
- [P5]. **Self-assembled InAs nanowires as optical reflectors.**
F. Floris, A. Marini, L. Fornasari, V. Bellani, F. Banfi, S. Roddaro, D. Ercolani, **M. Rocci**, F. Beltram, L. Sorba, F. Rossella.
Nanoscale **7** (11), 400 (2017)

- [P6]. **Crystal phases in hybrid metal-semiconductor nanowire devices.**
J. David, F. Rossella, **M. Rocci**, D. Ercolani, L. Sorba, F. Beltram, M. Gemmi, and S. Roddaro.
Nano Letters, **17** (4), 2336 (2017)
- [P7]. **InAs nanowire superconducting tunnel junctions: quasiparticle spectroscopy, thermometry and nanorefrigeration.**
J. Mastomaki, S. Roddaro, **M. Rocci**, D. Ercolani, L. Sorba, I. J. Maasilta, N. Ligato, A. Fornieri, E. Strambini, and F. Giazotto.
Nano Research, **1**, 1-6 (2017)
- [P8]. **Tunable Esaki effect in catalyst-free InAs/GaSb core-shell nanowires.**
M. Rocci, F. Rossella, U. P. Gomes, V. Zannier, F. Rossi, D. Ercolani, L. Sorba, F. Beltram, and S. Roddaro.
Nano Letters, **16** (12), 7950 (2016)
- [P9]. **GHz electroluminescence modulation in nanoscale subwavelength emitters.**
F. Rossella, V. Piazza, **M. Rocci**, D. Ercolani, L. Sorba, F. Beltram, S. Roddaro.
Nano Letters **16** (9), 5521 (2016).
- [P10]. **Local noise in a diffusive conductor.**
E. S. Tikhonov, D. V. Shovkun, D. Ercolani, F. Rossella, **M. Rocci**, L. Sorba, S. Roddaro, V. S. Khrapai.
Scientific Reports **6**, 30621 (2016).
- [P11]. **Noise thermometry applied to thermoelectric measurements in InAs nanowires.**
E. Tikhonov, D. Shovkun, V. Khrapai, D. Ercolani, F. Rossella, **M. Rocci**, L. Sorba, S. Roddaro.
Semiconductor Science & Technology **31**, 104001 (2016).
- [P12]. **Proximity Driven Commensurate Pinning in YBa₂Cu₃O₇ through All-Oxide Magnetic Nanostructures.**
M. Rocci, J. Azpeitia, J. Trastoy, A. Perez-Muñoz, M. Cabero, R. F. Luccas, C. Munuera, F. J. Mompean, M. Garcia-Hernandez, K. Bouzehouane, Z. Sefrioui, C. Leon, A. Rivera-Calzada, J. E. Villegas and J. Santamaria.
Nano Letters **15** (11), 7526 (2015).
- [P13]. **Paving the way to nanoionics: atomic origin of barriers for ionic transport through interfaces.**
M. A. Frechero, **M. Rocci**, G. Sánchez-Santolino, Amit Kumar, J. Salafranca, Rainer Schmidt, M. R. Díaz-Guillén, O. J. Durá, A. Rivera-Calzada, R. Mishra, Stephen Jesse, S. T. Pantelides, Sergei V. Kalinin, M. Varela, S. J. Pennycook, J. Santamaria & C. Leon.
Scientific Reports **5**, 17229 (2015).
- [P14]. **Resistive switching in manganite/graphene hybrid planar nanostructures.**
M. Rocci, J. Tornos, A. Rivera, Z. Sefrioui, M. Clement, E. Iborra, C. Leon and J. Santamaria.
Applied Physics Letters **104**, 102408 (2014).
- [P15]. **Caracterización eléctrica de fronteras de grano en conductores iónicos mediante medidas de espectroscopia de impedancias en un bicristal.**
M. A. Frechero, **M. Rocci**, Rainer Schmidt, M. R. Díaz-Guillén, O. J. Durá, A. Rivera-Calzada, J. Santamaria, C. Leon.
Boletín de la Sociedad Española de Cerámica y Vidrio **51** (1), 13-18 (2012).
- [P16]. **Symmetrical interfacial reconstruction and magnetism in La_{0.7}Ca_{0.3}MnO₃/YBa₂Cu₃O₇/La_{0.7}Ca_{0.3}MnO₃ heterostructures.**
C. Visani, J. Tornos, N. M. Nemes, **M. Rocci**, C. Leon, S. G. E. te Velthuis, Yaohua Liu, A.

Hoffmann, J. W. Freeland, M. Garcia-Hernandez, M. R. Fitzsimmons, B. J. Kirby, M. Varela, S. J. Pennycook and J. Santamaria.

Physical Review B **84**, 060405(R) (2011).

[P17]. **Directionally controlled superconductivity in ferromagnet/superconductor/ferromagnet trilayers with biaxial easy axes.**

C. Visani, N. M. Nemes, **M. Rocci**, Z. Sefrioui, C. Leon, S. G. E. te Velthuis, A. Hoffmann, M. R. Fitzsimmons, F. Simon, T. Feher, M. Garcia-Hernandez, J. Santamaria.

Physical Review B **81**, 094512 (2010).

LIST OF INTERNATIONAL PUBLICATIONS (UNDER REVIEW)

1. **Thermal biasing at nanoscale.**

A. O. Denisov, E. S. Tikhonov, S. U. Piatrusha, F. Rossella, M. Rocci, L. Sorba, S. Roddaro, and V. S. Khrapai.

Submitted to *Physical Review Applied* (2019).

INTERNATIONAL CONFERENCES (INCLUDING INVITED PRESENTATIONS)

1. **High Field Superconductivity and Magnetic Moment Enhancement in Proximity Exchange Coupled GdN/NbN Nano-bridges.**

APS - March Meeting. Denver, Colorado (U.S.A.) - March (2020). (*Oral presentation*).

2. **[INVITATO] Dalle Aule del D'Aosta ai Laboratori del MIT.**

Istituto d'Istruzione Superiore "Amedeo D'Aosta" – L'Aquila (Italy) – May (2019) (2 hours Seminar).

Invited by: Prof. Maria Chiara Marola.

3. **Enhanced Superconductivity and Infinite Electro-Resistance in Proximity Exchange Coupled Superconductor Nano-bridges by Electric Field – Towards First Generation of Triplet Paired Superconductor FETs.**

APS - March Meeting. Boston, Massachusetts (U.S.A.) - March (2019). (*Oral presentation*).

4. **[INVITED] Proximity and interfacial effects in nanostructured hybrid heterojunctions.**

Francis Bitter Magnet Laboratory & Plasma Science and Fusion Center, Massachusetts Institute of Technology, Cambridge (US) – September (2017). (*Oral presentation*).

Invited by: Dr. Jagadeesh Moodera.

5. **Tunable Esaki effect in broken-gap core-shell nanowires.**

Nanowire Week 2017. Lund (Sweden) – May-June (2017).

6. **Memristive behavior in tunnel junctions with graphene oxide barrier.**

APS - March Meeting. San Antonio, Texas (U.S.A.) - March (2015). (*Oral presentation*).

7. **[INVITED] Complex oxide nanostructures for functional applications.**

Raith User Meeting – RUM2014. Zaragoza (Spain), October (2014). (*Oral presentation*).

8. **Manganite magnetic tunnel junctions with graphene oxide barriers.**

XXX Trobades Científiques de la Mediterrània Josep Miquel Vidal "Graphene and Related Materials. Production, Characterization and Applications". Menorca (Spain), October (2014). (*Oral presentation*).

9. **Hysteretic Transport in Manganite/Graphene Hybrid Planar Nanostructures.** Workshop PICATA 2013. Madrid (Spain), February (2013). (*Oral presentation*).
10. **Hysteretic Transport in Oxide/Graphene Hybrid Planar Nanostructures.** NANOLITO 2012. San Sebastián (Spain), November (2012). (*Oral presentation*).
11. **Tunable Esaki effect in broken-gap core-shell nanowires** CMD26. Groningen, (The Netherlands) – September 2016. (*Poster contribution*).
12. **Proximity driven commensurate pinning in $\text{YBa}_2\text{Cu}_3\text{O}_7$ through all-oxide magnetic nanostructures.** GEFES 2016. Cuenca, (Spain) – January 2016. (*Poster contribution*).
13. **Hysteretic Transport in Manganite/Graphene Hybrid Planar Nanostructures.** ISOE2013. Cargèse, Corsica (France) – September (2013). (*Poster contribution*).
14. **Hysteretic Transport in Manganite/Graphene Hybrid Planar Nanostructures.** IMAGINENANO - GRAPHENE 2013. Bilbao (Spain) – April (2013). (*Poster contribution*).

INTERNATIONAL SCHOOLS & WORKSHOPS

1. **Workshop: Quantum Computing and High Performance Computing.** CINECA, Bologna (Italy) – December 2018.
2. **Symposium. LAUNCH.nano: MIT.nano.** Massachusetts Institute of Technology, Cambridge (US) – October (2018).
3. **Workshop: High Structural and Spatial Resolution using Raman Confocal and Scanning Probe Microscopy.** Cantoblanco, Madrid (Spain) – November (2013).
4. **International School of Oxide Electronics (ISOE 2013).** Cargèse, Corsica (France) – September (2013).
5. **Workshop GRAPHēNe: A mobilizing action in an emerging field.** ICMM – CSIC Cantoblanco, Madrid (Spain) – April (2013).
6. **II Workshop on the Physics of Complex Oxides.** Alcudia, Mallorca/Majorca (Spain) – October (2012).
7. **Workshop GRAPHēNe: A mobilizing action in an emerging field.** IMDEA, E.T.S. de Ingenieros de Caminos – Madrid (Spain) – September (2011).
8. **European School on Multiferroics (ESMF2010).** Univesità degli Studi dell'Aquila – L'Aquila (Italy) – September (2010).

SUPERVISION OF STUDENTS

- | | |
|-------------------|---|
| 07/2018 – 08/2018 | 2 High School Students (M. Cua, G. Narayanan).
Massachusetts Institute of Technology, Cambridge (USA) |
| 06/2015 – 07/2017 | 2 Master Students (J. Mastomaki, O. Durante).
NEST – Scuola Normale Superiore, Pisa (Italy). |
| 10/2009 – 07/2013 | 2 Master Students (T. Cebriano-Ramirez, D. Sueiro).
Physics of Complex Materials Group, Universidad Complutense de Madrid (Spain). |

MEMBERSHIPS OF SCIENTIFIC SOCIETIES & NETWORKS

From 2016	ArXiv (http://arxiv.org).
From 2012	ResearchGate (http://www.researchgate.net).
From 2009	LinkedIn (https://www.linkedin.com).
From 2014	American Physical Society (APS).
2009-2011	Italian Physical Society (SIF).