CURRICULUM VITÆ

Personal data

Name | PD Dr. Andrea Donarini

Date of birth | 14 June 1977 Place of birth | Treviglio (Italy)

Citizenship Italian

Family status | Married. Two children.

Contacts

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Education

Habilitation | 15 January 2014

Thesis | Transport through complex interacting nanojunctions;

Mentors | Prof. M. Grifoni, Prof. K. Richter and Prof. A.-P. Jauho;

Institute | Universität Regensburg.

Ph.D. in Physics 27 October 2004

Thesis | Dynamics of Shuttle Devices;

Grade | Full grades;

Supervisors | Prof. Antti-Pekka Jauho and Dr. Tomaš Novotný;

Institute | Danmark Tekniske Universitet (DTU).

Degree in Physics 21 March 2001

Thesis | Fisica delle nanostrutture a doppio strato

(Physics of double-layer nanostructures);

Grade | Full grades and distinction (110/110 summa cum laude);

Supervisors | Prof. Ruggero Ferrari and Dr. Luca Molinari;

Institute | Università degli Studi di Milano.

Maturità classica 25 July 1996

Grade | Full grades (60/60);

Institute | Istituto Salesiano di Treviglio.

Work experience

Scientific appointments

Mar 2016 - present | Assistant Professor (staff member) at the University of Regensburg (UR);

Oct 2014 - Feb 2016 | Senior Researcher at UR;

Apr 2013 - Sep 2014 | Substitute Professor at UR;

2010 - 2014 | Habilitand at UR;

2006 - 2013 Research Assistant in the group of Prof. Milena Grifoni at UR;

2004 - 2006 | Post-doc in the Theoretical Physics Department of UR

in the research group of Prof. Milena Grifoni.

Organized Conference

18 - 20 Apr 2017 | Many Paths to interference:

a journey between quantum dots and single molecule junctions

Scientific organization in collaboration with Dr. Linda A. Zotti

Host institution | Max Planck Institute for the Physics of Complex Systems,

Dresden (Germany)

Research visits

2011: Sep-Oct | Donostia International Physics Center in the group of Prof. P. Echenique.

Donostia-San Sebastián (Spain).

2003: Oct-Dec | Manchester Institute of Science and Technology in the group of Prof. T. Brandes.

Manchester (United Kingdom).

Administration

Oct 2017 - present Faculty representative in the Directive Committee for the University Sport Center.

Apr 2016 - Mar 2018 Frauenbeauftragter for the Faculty of Physics.

Oct 2015 - Sep 2017 | Memeber of the PhD committe (Promotionskommission) for the Faculty of Physics.

| ${\bf Supervision}^1$ | |
|-----------------------|--|
| Ph.D. | |
| M. Niklas | Current and noise properties of interacting nanojunctions – 2015 - 2018; |
| B. Siegert | Transport properties of metal phthalocyanine STM junctions – 2011-2015; |
| S. Pfaller | Transport properties of nanodevices with superconducting elements – 2011-2015; |
| D. Darau | Symmetry and electronic properties of conjugated molecules – ongoing; |
| A. Yar | Electron-vibron effects in interacting quantum dot systems – 2009-2012; |
| S. Sobczyk | STM transport theory for π -conjugated molecules on thin insulating films – 2009-2012; |
| G. Begemann | Quantum interference phenomena in transport through molecules and multiple quantum dots – 2006-2009. |
| M.Sc. | |
| M. Frankerl | Modelling of THz-STM in single molecule junctions – ongoing |
| C. Rohrmeier | Fingerprints of interference in cotunnelling dominated transport – ongoing |
| R. Kozlowsky | Vibronic effects in the transport characteristics of STM single molecule junctions – 2014-2015 |
| Diploma | |
| B. Siegert | Transport through metal phthalocyanine molecular bridges – 2010-2011; |
| S. Pfaller | Transport through quantum dot devices with superconducting leads – 2010-2011; |
| F. Krämer | Linear combination of molecular orbitals – 2009-2010; |
| R. Hornberger | Spin transport through coupled quantum dots – 2006-2007; |
| G. Begemann | Interaction phenomena in benzene rings – 2005-2006. |
| B.Sc. | |
| S. Condussio | Coulomb Blockade effects in semiconductive islands – 2014-2015. |
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¹According to German law, the official supervisor for the diploma works and dissertations prior to January 2014 is Prof. Milena Grifoni. The scientific supervision belongs always to my assignment.

Teaching

| Lectures | |
|-------------------|---|
| ST 18 | Density Matrix Theory; |
| WT 17/18 | Applications of Group Theory to the Condensed Matter Physics; |
| ST 17 | Quantum Theory of Condensed Matter; |
| ST 16 | Applications of Group Theory to the Condensed Matter Physics; |
| ST 14 | Applications of Group Theory to the Condensed Matter Physics; |
| WT 13/14 | Density Matrix Theory; |
| ST 13 | Applications of Group Theory to the Condensed Matter Physics; |
| WT 09/10 | Quantum Theory of Condensed Matter II: Mesoscopic Physics. |
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| Tutorials | |
| WT 17/18 | Applications of Group Theory to the Condensed Matter Physics; |
| ST 17 | Quantum Theory of Condensed Matter; |
| WT 16/17 | Mathematical Methods for Physicists; |
| WT 16/17 | Integrated Course II for élite students: Statistical and Solid State Physics; |
| ST 16 | Applications of Group Theory to the Condensed Matter Physics; |
| WT 15/16 | Quantum Theory of Condensed Matter II: Mesoscopic Physics; |
| WT 14/15 | Quantum Theory of Condensed Matter II: Mesoscopic Physics; |
| ST 14 | Applications of Group Theory to the Condensed Matter Physics; |
| WT 13/14 | Density Matrix Theory; |
| ST 13 | Applications of Group Theory to the Condensed Matter Physics; |
| WT 12/13 | Integrated Course II for élite students: Statistical and Solid State Physics; |
| ST 12 | Statistical Physics; |
| WT 11/12 | Waves and Quanta; |
| ST 11 | Density Matrix Theory II; |
| WT 10/11 | Density Matrix Theory; |
| ST 10 | Quantum Theory of Condensed Matter I; |
| ST 09 | Quantum Theory of Condensed Matter I; |
| WT 08/09 | Quantum Mechanics II; |
| ST 08 | Quantum Theory of Condensed Matter I; |
| WT 07/08 | Quantum Mechanics II; |
| ST 07 | Quantum Theory of Condensed Matter I; |
| WT 06/07 | Mechanics; |
| ST 06 WT 05/06 | Quantum Theory of Condensed Matter I; Waves and Quanta; |
| ST 05 | Thermodynamics; |
| WT 04/05 | Mechanics. |

Funding

CRC 1277/I Emergent relativistic effects in condensed matter

Role | Principal investigator

Project | Spin-orbit induced dynamics in driven molecular systems

Period Third funding phase (2017-2021)

Funding | 1 PhD student

SFB 689/III | Spin phenomena in reduced dimensions

Role | Principal investigator

Project | Spin-dependent transport through individual molecules

Period | First funding phase (2014-2017)

Funding | 1 PhD student

SFB 689/II Spin phenomena in reduced dimensions

Role | Principal investigator

Project | Spin-dependent transport through single molecules

Period | Second funding phase (2010-2013)

Funding | 1 PhD student

SPP 1243/3 Quantum transport at the molecular scale

Role | Principal investigator

Project | Vibration effects, intramolecular interference and switching

in interacting molecular junctions

Period Third funding phase (2010-2012)

Funding | 1 PhD student

Talks

- ♦ Popular science talk at the University of Crema, Crema (Italy), 23 March 2018 -[invited]: Vedere è sapere: immagini e suggestioni dal nanomondo;
- ♦ 82nd Annual Meeting of the Deutsche Physikalische Gesellschaft Berlin (Germany), 11-16 March 2018: Dark states in a carbon nanotube quantum dot;
- ♦ 82nd Annual Meeting of the Deutsche Physikalische Gesellschaft Berlin (Germany), 11-16 March 2018: Apparent reversal of molecular orbitals reveals entanglement;
- Nano-Seminar at the Department of Condensed Matter Physics of the University 2017 of Prague - Prague (Czech Republic), 12 October 2017 - [invited]: Apparent reversal of molecular orbitals reveals entanglement;
 - Workshop of the SFB 689 "Spinphenomena in reduced dimensions" and CRC 1277 "Emergent relativistic effects in condensed matter"- Frauenchiemsee (Germany), 4-6 October 2017: Time-dependent dynamics in molecular junctions;
 - \diamond 81 st Annual Meeting of the Deutsche Physikalische Gesellschaft Dresden (Germany), 19-24 March 2017: Fano stability diagram of a symmetric triple quantum dot:
 - International Workshop "Quantum-Classical Transition in Many-Body Systems" -Dresden (Germany), 12-17 February 2017 - [invited]: Many-body interference in interacting nanojunctions;
 - ⋄ Condensed Matter Theory Group Seminar Regensburg (Germany), 23 November 2016: Modelling vibrations in STM single molecule junctions: a step beyond the Anderson-Holstein paradigm;
 - ♦ Workshop of the SFB 689 "Spinphenomena in reduced dimensions" Neumarkt (Germany), 04-06 October 2016: Apparent reversal of molecular orbitals reveals entanglement;
 - ♦ International workshop:"Towards Reality in Modelling of Molecular Electronics" -Donostia (Spain), 13-17 June 2016 - [invited]: Many-body correlations in STM single molecule junctions;
 - \diamond 80 th Annual Meeting of the Deutsche Physikalische Gesellschaft Regensburg (Germany), 6-11 March 2016: Spin-orbit coupling and many-body correlations in STM transport through Cu-phthalocvanine:
 - ♦ Seminar at the Donostia International Physics Center Donostia (Spain), 29 February 2016 - [invited]: Many-body correlations in a Cu-phthalocyanine STM single molecule junction;
 - ♦ Workshop of the SFB 689 "Spinphenomena in reduced dimensions" -Frauenchiemsee (Germany), 5-7 October 2015: Non-equilibrium spin-crossover in Cu-Phthalocyanine;
 - ♦ 79th Annual Meeting of the Deutsche Physikalische Gesellschaft Berlin (Germany), 15-20 March 2015: Charge fluctuation effects in superconductor-quantum dot hybrid systems;
 - ♦ 79th Annual Meeting of the Deutsche Physikalische Gesellschaft Berlin (Germany), 15-20 March 2015: Thermally induced subgap features in the cotunneling spectroscopy of a carbon nanotube;
 - Workshop of the research training school "Carbon Based Nanostructures" -Schönsee (Germany) 26 September 2014: Scanning probe microscopy of graphene with a CO terminated tip;

2018

2016

2014

Talks (continues)

- ⋄ Condensed Matter Theory Group Seminar Regensburg (Germany) 7 May 2014:
 Scanning probe microscopy of graphene with a CO terminated tip;
- \diamond 78^{th} Annual Meeting of the Deutsche Physikalische Gesellschaft Dresden (Germany), 31 March 4 April 2014: Fingerprints of thermal quasiparticle excitations in CNT-superconductor hybrid junctions;
- \diamond 78th Annual Meeting of the Deutsche Physikalische Gesellschaft Dresden (Germany), 31 March 4 April 2014: *Multi-orbital STM theory for* π *-conjugated molecules on thin insulating films* ;
- \diamond 78th Annual Meeting of the Deutsche Physikalische Gesellschaft Dresden (Germany), 31 March 4 April 2014: *Fixing the energy scale in Scanning Tunnelling Microscopy on semiconductor surfaces*;
- Physikalisches Kolloquium, in the framework of the Habilitation process Regensburg (Germany), 10 February 2014 [invited]: Transport through complex interacting nanojunctions;

2013

- ♦ Tutorial in the framework of the Research Training program GRK 1570 Regensburg (Germany), 19 July 2013 [invited]: Coulomb blockade and single electron tunnelling:
- ♦ Seminar in the research group of Prof. J. Repp Regensburg (Germany), 3 July 2013 - [invited]: Shallow Acceptors in GaAs: Experiment and Theory - in collaboration with G. Muennich:
- Seminar within the Graduate School of Nanoscience: "Talk nano!" Regensburg (Germany), 7 May 2013 [invited]: Interference: From quantum mechanics to nanotechnology;
- ⋄ International conference "ImagineNano 2013" Bilbao (Spain), 22-26 April 2013: Topographical fingerprints of many-body interference blocking in STM junctions on thin insulating films;
- ⋄ Seminar within the "International Max Planck Research School" Dresden (Germany), 17 April 2013 - [invited]: STM on thin insulating films: A density matrix approach;
- ♦ International workshop: "Building blocks for carbon-based electronics: From molecules to nanotubes" Regensburg (Germany), 10-12 April 2013 [invited]: Many-body interference in STM single molecule junctions on thin insulating films;
- ⋄ 77th Annual Meeting of the Deutsche Physikalische Gesellschaft Regensburg (Germany), 10-15 March 2013: Thermal quasiparticle spectroscopy of a carbon nanotube quantum dot coupled to superconducting leads: part II, theory;
- \diamond 77th Annual Meeting of the Deutsche Physikalische Gesellschaft Regensburg (Germany), 10-15 March 2013: *STM theory for* π -conjugated molecules on thin insulating films;
- \diamond CECAM international workshop "Molecular electronics: Quo vadis?" Bremen (Germany), 4-8 March 2013 [**invited**]: Theory of STM junctions for π -conjugated molecules on thin insulating films;

- ⋄ International conference "Fuerzas y Tunel 2012" San Lorenzo de El Escorial (Spain), 12-14 September 2012: Topographical fingerprints of many-body interference blocking in STM junctions on thin insulating films;
- ♦ International Conference "Nanoscience and Technology 2012" Paris (France), 23-27 July 2012: Spectrum and Franck-Condon factors of interacting SWCNTs;

Talks (continues)

- Seminar in the research group of Prof. G. Platero, Instituto de Ciencia de Materiales, Madrid (Spain), 25 April 2012 - [invited]: Spectrum and Franck-Condon factors of interacting SWCNTs;
- ♦ Capri Spring School "Transport in Nanostructures 2012", Capri (Italy), 15-22 April 2012: *Transport through multiple quantum dots coupled to superconducting leads*;
- $\diamond~76^{th}$ Annual Meeting of the Deutsche Physikalische Gesellschaft Berlin (Germany), 25-30 March 2012: Coulomb blockade in molecular junctions with intermediate coupling to the leads;
- \diamond 76th Annual Meeting of the Deutsche Physikalische Gesellschaft Berlin (Germany), 25-30 March 2012: *STM transport theory for* π -conjugated molecules on thin insulating films;
- \diamond Group Theory Seminar in the group of Dr. Mads Brandbyge, DTU Nanotech, Lyngby (Denmark), 5 March 2012 [**invited**]: *Theory of STM junctions for* π -conjugated molecules on thin insulating films;

2011

- ♦ International workshop "Carbon-based Spintronics" Dresden (Germany), 24-28 October 2011: All-electrical spin control in a benzene interference single electron transistor;
- ⋄ Seminar in the research group of Prof. P.Echenique at the Donostia International Physics Center - Donostia (Spain), 7 September 2011 - [invited]: Interference blockade in symmetric nano-junctions;
- \diamond 75th Annual Meeting of the Deutsche Physikalische Gesellschaft Dresden (Germany), 13-18 March 2011: *Negative differential conductance with symmetric set-up?*;
- \diamond 75th Annual Meeting of the Deutsche Physikalische Gesellschaft Dresden (Germany), 13-18 March 2011: Interference and transport through π -conjugated molecules in an STM set-up;
- Physikalisches Kolloquium, in the framework of the Habilitation process,
 Regensburg (Germany), 31 January 2011 [invited]: Interference and interaction in symmetric nanojunctions;

2010

- ⋄ Workshop of the GRK 1570 "Electronic Properties of Carbon Based Nanostructures", St. Englmar (Germany), 6 October 2010: STM theory for pi-conjugated molecules on thin insulating films;
- ♦ Workshop of the SFB 689 "Spinphenomena in reduced dimensions", Niederaltaich (Germany), 30 September 2010: All electrical spin preparation in a triple dot I-SET;
- Seminar in the research group of Prof. J. Repp, University of Regensburg (Germany), 16 June 2010 - [invited]: Interference effects in single molecule junctions (from SET to STM);
- Seminar in the research group of Prof. G. Platero at the Instituto de Ciencias de Materiales de Madrid (Spain), 9 April 2010 - [invited]: Interference blockade in symmetric nano-junctions;
- ⋄ 74th Annual Meeting of the Deutsche Physikalische Gesellschaft Regensburg,
 22-27 March 2010: Interference spin-blockade in symmetric nano-junctions;

- Seminar in the research group of Prof. Ankerhold at the University of Ulm (Germany), 27 May 2009 - [invited]: Charge and spin transport through Interference Single Electron Transistors;
- \diamond 73 rd Annual Meeting of the Deutsche Physikalische Gesellschaft Dresden (Germany), 22-27 March 2009: *Effective spin-orbit coupling in a benzene interference SET*;

Talks (continues)

2008

- \diamond 25 th International Conference on Low Temperature Physics Amsterdam (Netherlands), 7-13 August 2008: *Interaction and coherence in a benzene SET*;
- ♦ Nanoelectronics days 2008 Aachen (Germany), 13-16 May 2008: Symmetry fingerprints of a benzene single-electron transistor;

2007

- Seminar in the research group of Prof. Cuniberti at the Technical University of Dresden - Dresden (Germany), 13 December 2007 - [invited]: Fingerprints of symmetry in transport through Anderson molecules;
- Mid term Meeting of the research group "Quantum transport at the molecular scale" - Bremen (Germany), 24-27 June 2007: Transport through Anderson molecules;

2006

- ♦ 14th European Conference on Mathematics for Industry Leganés Madrid (Spain), 10-14 July 2006 - [invited]: Quantum shuttle: physics of a numerical challenge;
- ⋄ Dynamical Phenomena in NEMS and Nano-electronics Daejeon (Korea) 28-30 June 2006 [invited]: Dynamical symmetry breaking in transport through molecules:
- ♦ 371. WE-Heraeus-Seminar Quantum Transport at the Molecular Scale Bad Honnef (Germany), 29 May -1 June, 2006: *Dynamical symmetry breaking in molecular transistors*:
- ⋄ 70th Annual Meeting of the Deutsche Physikalische Gesellschaft Dresden (Germany), 27-31 March 2006: *Electromechanical properties of a biphenyl transistor*:
- ⋄ Nanoelectronics 2006, Novel Nanomaterials, Quantum Transport, and Noise of Electrons and Photons - Lancaster (England), 8-11 January 2006: Electromechanical properties of a biphenyl transistor;

2005

- ♦ Annual Meeting of the DFG Research School 638 Nonlinearity and Nonequilibrium in Condensed Matter - Windberg (Germany), 27-29 September 2005: Shuttle devices:
- \diamond 69 th Annual Meeting of the Deutsche Physikalische Gesellschaft Berlin (Germany), 4-9 March 2005: *Giant super-poissonian Fano factors in shuttle devices*:

2004

⋄ 20th General Conference of the Condensed Matter Division of the European Physical Society - Prague (Czech Republic), 19-23 July 2004: Current noise of shuttle devices;

2002

⋄ Norfa Network Meeting - Höör (Sweden), 15-17 September 2002: Transport through an oscillating quantum dot.

Posters

2017

♦ International Conference on Low Temperature Physics - Gothenburg (Sweden), 9-16 August 2017: Apparent reversal in molecular orbitals reveals entanglement;

2016

⋄ International Winterschool on Electronic Properties of Novel Materials - Kirchberg in Tirol (Austria), 14-19 February 2016: Non-equilibrium spin-crossover in copper phthalocyanine;

2014

 \diamond 78^{th} Annual Meeting of the Deutsche Physikalische Gesellschaft - Dresden (Germany), 31 March -4 April 2014: *Spin blockade effects in a GaMnAs double quantum dot system*;

2013

- International workshop: "Building blocks for carbon-based electronics: From molecules to nanotubes" - Regensburg (Germany), 10-12 April 2013: Thermal quasi-particle spectroscopy of a carbon nanotube quantum dot coupled to superconducting leads;
- International workshop: "Building blocks for carbon-based electronics: From molecules to nanotubes" Regensburg (Germany), 10-12 April 2013: Topographical fingerprints of many-body interference in STM junctions on thin insulating films;

2012

- ⋄ International conference "ElecMol 12" Grenoble (France), 3-7 December 2012: Topographical fingerprints of many-body interference in STM junctions on thin insulating films;
- \diamond International Conference on Nanoscience and Technology Paris (France), 23-27 July 2012: Theory of STM junctions for π -conjugated molecules on thin insulating films:
- \diamond 76th Annual Meeting of the Deutsche Physikalische Gesellschaft Berlin (Germany), 25-30 March 2012: The role of the tip symmetry on the STM topography of π conjugated molecules;
- 76th Annual Meeting of the Deutsche Physikalische Gesellschaft Berlin (Germany), 25-30 March 2012: Vibration induced memory effects in molecular nanojunctions;

2011

- International workshop "Carbon-based spintronics" Dresden (Germany), 24-28
 October 2011: Interference effects in the Coulomb blockade regime: Current blocking and spin preparation in symmetric nanojunctions;
- International Winterschool "Electronic Properties of Novel Materials" Kirchberg (Austria), 26 February-5 March 2011: Effects of spin/pseudo-spin degeneracies in the transport properties of suspended SWCNT;

2010

- \diamond ElecMol'10: 5^{th} International meeting on molecular electronics Grenoble (France) 06-10 December 2010: Interference effects in STM single molecule junctions;
- ♦ JARA-FIT nanoelectronics days 2010 Aachen (Germany) 04-07 October 2010: Interference and transport through benzene in an STM set-up;
- ⋄ 74th Annual Meeting of the Deutsche Physikalische Gesellschaft Regensburg (Germany), 22-27 March 2010: Interference in transport through single molecules in a STM set-up;
- ♦ International Conference on Molecular Electronics Emmetten (Switzerland), 5-9 January 2010: All-electric spin control in interference SETs;

- ♦ International CECAM-Workshop "Quantum Transport on the Molecular Scale" Bremen (Germany), 14-18 September 2009: *Interference blockade through a terphenyl SET*;
- \diamond 73rd Annual Meeting of the Deutsche Physikalische Gesellschaft Dresden (Germany), 22-27 March 2009: *Charge transport through an interference SET*;

Poster (continues)

♦ Trends in Nanoscience 2009 - Kloster Irsee (Germany), 28 February - 4 March 2009: A benzene interference-single electron transistor;

2008

- \diamond 72 nd Annual Meeting of the Deutsche Physikalische Gesellschaft Berlin (Germany), 25-29 February 2008: *Excited states in the conductance of a double dot*;
- International Workshop on Interaction and Interference in Nanoscopic Transport -Dresden (Germany), 18-23 February 2008: Fingerprints of symmetry in transport through Anderson molecules;

2007

- ⋄ 71st Annual Meeting of the Deutsche Physikalische Gesellschaft Regensburg (Germany), 26-30 March 2007: Charge and spin transport in double quantum dot systems;

2004

- ⋄ Frontiers in Quantum and Mesoscopic Thermodynamics Prague (Czech Republic), 26-29 July 2004: Current noise in shuttle devices;
- ⋄ Fundamental Problems in Nanomechanical Systems Gothenburg (Sweden), 5-7 June 2004: Current noise in shuttle devices;

2003

 \diamond 15^{th} International Conference on Electronic Properties of Two-Dimensional Systems - Nara (Japan), 14-18 July 2003: *Shuttle instabilities: Semiclassical phase analysis*;

2002

- \diamond 26^{th} International Conference on the Physics of Semiconductors Edinburgh (Scotland), 29^{th} June- 2^{nd} July 2002: *Photon-mediated drag in double-layer electron gas*;
- Danish Physical Society Annual Meeting Nyborg (Denmark), 30-31 May 2002:
 Photonic Contribution to Coulomb Drag;

2001

⋄ XX Convegno di Fisica Teorica e Struttura della Materia - Fai della Paganella (Italy), 25-28 March 2001: Contributo fotonico al Coulomb Drag;

2000

⋄ Euroconference on Spin effects in mesoscopic systems - Cortona (Italy), 28 June-2 July 2000.

Other interests

Languages

Italian | Mother tongue;

English | Fluent in written and oral communication;

Spanish | Fluent in written and oral communication;

German Good communication skills:

French | Basic knowledge;

Danish | Basic knowledge.

Music

I have played the violin for many years at an excellent amateur level. Since October 2013 I sing in the Choir Novacappella Regensburg.