

# Curriculum Vitae and List of Publications

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## Rocco Gaudenzi

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## Personal

Date and Place of birth: 12 December 1987, Bologna

Citizenship: Italian

Languages: Italian (mother tongue), English (full professional proficiency), German (B1 Niveau)

## Synopsis

After a High School degree in Classics (It. *Liceo Classico*), I earned a Bachelor degree in Physics at the University of Roma Tre, discussing from the physics and philosophical standpoint the role of the electromagnetic potentials in quantum theory; and then a Master degree at the ETH Zurich with a *Master-arbeit* on the integer and fractional quantum Hall effect in two-dimensional electron systems. I then moved to the Technical University of Delft (TU Delft, NL) to investigate quantum transport mechanisms in nanostructures, focusing in particular on those phenomena involving quantum magnetism, superconductivity, and thermodynamics of information. After the PhD, fulfilling my original desire to go past the research in science in favour of the enquiry on its historical-epistemological dimension and conceptual dynamics, I was awarded a two-year Rubicon grant (the Dutch *Marie Curie fellowship*) to pursue research at the Max Planck Institute for the History of Science (Berlin, DE). Here I am currently investigating the conceptual connections established in the last century between condensed matter and elementary particle physics, paying particular attention to the methods and heuristic thought processes entailed in the cross-disciplinary knowledge transfer, and focusing on the role played in it by analogical and metaphorical thinking. This research is currently being put together as a monograph, and has resulted, among others, into the university course "What's in an analogy? A journey from the sciences to the humanities and back", directed to science as well as humanities students. Alongside research, I devote myself to teaching and dissemination, experimenting there with various formats including theatre and broad audience lectures and annually co-organise an event that strives to integrate the scientific discourses with reflections on humanities and society.

## Work history

- Nov 2020 – Today** Postdoctoral fellow, Max Planck Institute for the History of Science, Berlin, DE
- Oct 2018 – Today** Rubicon Postdoc fellow, Max Planck Institute for the History of Science, Berlin, DE  
(The period includes a three-month paternity leave between Jul. and Sept. 2019 owing to the birth of my daughter)
- Feb 2018 – Aug 2018** Visiting Scholar, Max Planck Institute for the History of Science, Berlin, DE

## Education

- Jun 2013 – Jun 2017** PhD in physics, Kavli Institute of Nanoscience, TU Delft, Delft, NL  
Quantum magnetism, Superconductivity, Thermodynamics of information
- Sep 2010 – Mar 2013** MSc in Physics (Overall Grade Point Average 5.63/6), ETH Zurich, Zurich, CH  
Condensed Matter Physics, Quantum Field Theory
- Jan 2010 – Apr 2010** Short sabbatical period in the USA  
History and Philosophy of quantum mechanics
- Sep 2006 – Oct 2009** BSc in Physics (110/110 *magna cum laude*), University Roma Tre, Rome, IT  
Major: Physics; Electives: History of mathematics, Phil. of physics and biophysics
- Sep 2001 – Jun 2006** Humanities Diploma, Classical Gymnasium T. Mamiani, Pesaro, IT  
Major subjects: Greek and Latin, philosophy, literature and art history

## Teaching and Supervision

- Spring semester 2021** Lecturer of own course "What's in an analogy? A Journey from the sciences to the humanities and back", 42 hours frontal lecturing, 8 ETCS; Bard College of Liberal Arts, Berlin, DE.
- Sep 2015 – Jun 2017** Supervision of the PhD Student Joeri de Bruijckere, TU Delft, NL.
- Fall semester 2015** Teaching Assistant for the BSc course "Classical mechanics", TU Delft, NL.
- Fall semester 2013/14** Teaching Assistant for the BSc course "Rational mechanics", TU Delft, NL.
- Aug 2014 – Apr 2015** Thesis supervisor of the Casimir-awarded master student Joeri de Bruijckere.

## Selected talks

- Sep 2020** "Far from the Particle Crowd: *Shugyosha* Nambu and *Michizane* Wheeler", 40th Congress of the Italian Society for the History of Physics and Astronomy, Bologna, IT.
- Aug 2020** "Analogies as visual tools in nuclear and particle physics", Conference of the European Society for the History of Science (ESHS), Bologna, IT.

**Sep 2019** "The Prehistory of Spontaneous Symmetry Breaking: A Cross-disciplinary Intrigue", 39th Congress of the Italian Society for the History of Physics and Astronomy, Pisa, IT.

**Oct 2018** "Concepts from mesoscopic physics in particle physics: steps in the construction of an analogy", History of Physics Conference of the American Institute of Physics (AIP), S. Sebastian, ESP.

**Mar 2017** "Reaching the Landauer limit at high-speed with a quantum nanomagnet", American Physical Society (APS) March Meeting, New Orleans, US.

**Jan 2017** "Superconducting proximity-induced Shiba states in an organic molecular junction", Physics Congress of the Dutch Organisation for Scientific Research (NWO), Veldhoven, NL.

**Nov 2016** "Playing with Maxwell's devil: thermodynamic limits in computation", ECMOLS Spintronics Conference, Bologna, IT.

**Nov 2015** Invited seminar on "Magnetism in individual molecules, electrons and cooper pairs", Theoretical physics dept., Chalmers University, Gothenburg, SV.

## Public lectures and dissemination actions (complete list upon request)

**Mar 2018** Screenplay of the theatrical pièce "Copernico non ci credeva", Broadcasted on Italian national radio channel (12.10.19 on "Piazza Verdi", Radio Tre); Restaged in several Italian theatres, festivals, and schools (e.g., SEGNI — New Generations festival Mantova, Oct. 2019).

**Dec 2017** Lecture "The road to Modern Science: the dominant thought and the enlightened combatants. Readings from Copernicus, Bruno and Galilei", Spazio Teatrale Il Grottino, Pesaro, IT.

**Sep 2009** Public talk to high-school students "Ratios in the Cosmos", Carlo Bo University, Urbino, IT.

## Selected awards and grants

**28 Jun – 3 Jul 2020** Awarded participation to the 70th Lindau Nobel Laureate Meeting, Lindau, DE.

**Jul 2018** Rubicon two-year Postdoctoral grant, Netherlands Organisation for Scientific Research (NWO), grant N.er 019.181SG.010 "The genesis of concepts in mesoscopic physics and their role in the reductionist search for a unified theory".

**Jun 2006** Scholarship award '*Giuseppe Occhialini*' for student directed to scientific faculties, awarded by Nobel Laureate Carlo Rubbia, Giuseppe Occhialini Foundation, Fossombrone, IT.

**May 2003** 1st prize for Philosophy with the essay *Sull'Attività* (a Galileian dialogue inspired by Heisenberg's *Physics and Philosophy*), Mamiani High-School Contest, Pesaro, IT.

**List of publications** (available also on Google Scholar and Orcid (<https://orcid.org/0000-0002-0762-6351>))*A. Publications in the field of History&Philosophy of Science (Peer-reviewed)*

1. **R. Gaudenzi** (2021) *The pre-history of spontaneous symmetry breaking: steps in the construction of an analogy* (monograph, accepted for the Springer Brief series, in preparation).
2. S. Furlan, **R. Gaudenzi** (2021) *The earth vibrates with metaphors: the Dirac sea and the geology of the vacuum* (sent for review)
3. J. Fraser, P.R. de Olano, **R. Gaudenzi**, A. Blum (2021) *The evolving role of approximation methods in physics* (in preparation).
4. S. Furlan, **R. Gaudenzi** (2021) *Far from the Particle Crowd: Shugyosha Nambu and Michizane-Wheeler*, In Proceedings of the XL SISFA Conference. Bologna.
5. **R. Gaudenzi** (2020) *Prolegomena to a Study on Analogy in Modern Physics: the Case of Spontaneous Symmetry Breaking*, in Proceedings of the 39th Annual conference of the Italian Society for the History of Physics and Astronomy, Pisa University Press, 245-251.
6. **R. Gaudenzi** (2019) *Entropy? Exercices de style*, Entropy **2019**, 21, 742.

*B. Publications in the field of Physics (Peer-reviewed)*

1. D. Groenendijk, N. Manca, J. de Bruijckere, A.M. Monteiro, **R. Gaudenzi**, H. van der Zant, A. Caviglia (2020), *Anisotropic magnetoresistance in spin-orbit semimetal SrIrO<sub>3</sub>*, The European Physical Journal Plus, **135**, 627.
2. **R. Gaudenzi**, D. Stefani, S. Cartamil-Bueno (2020), *Light-induced propulsion of graphene-on-grid sails in microgravity*, Acta Astronautica, **174**, 204-210.
3. P. Zalom, J. De Bruijckere, **R. Gaudenzi**, H. van der Zant, T. Novotny, R. Korytar (2019) *Magnetically tuned Kondo effect in a molecular double quantum dot: Role of the anisotropic exchange*, The Journal of Physical Chemistry C, **123**, 11917.
4. **R. Gaudenzi**, E. Burzurí, S. Maegawa, H.S.J. van der Zant, F. Luis (2018) *Quantum Landauer erasure with a molecular nanomagnet*, Nature Physics **14**, 565–568.
5. A. M. Monteiro, D. J. Groenendijk, I. Groen, J. de Bruijckere, **R. Gaudenzi**, H.S.J. van der Zant, A. D. Caviglia (2017) *Two-dimensional superconductivity at the (111) LaAlO<sub>3</sub>/SrTiO<sub>3</sub> interface*, Physical Review B. **96**, 020504.
6. **R. Gaudenzi**, J. de Bruijckere, D. Reta, I. de P.R. Moreira, C. Rovira, J. Veciana, H.S.J. van der Zant, E. Burzurí (2017) *Redox-induced gating of the exchange interactions in a single organic diradical*, ACS nano **11** (6), 5879-5883.
7. J. O. Island, **R. Gaudenzi**, J. de Bruijckere, E. Burzurí, C. Franco, M. Mas-Torrent, C. Rovira, J. Veciana, T. M. Klapwijk, R. Aguado, H.S.J. van der Zant (2017) *Proximity-induced Shiba states in a molecular junction*, Phys. Rev. Lett. **118**, 117001.

8. **R. Gaudenzi**, M. Misiorny, E. Burzurí, M. R. Wegewijs, H.S.J. van der Zant (2017) *Transport mirages in single-molecule devices*, J. Chem. Phys. **146**, 092330.
9. **R. Gaudenzi**, E. Burzurí, D. Reta, I. de P.R. Moreira, S. Bromley, C. Rovira, J. Veciana, H. van der Zant (2016) *Exchange coupling inversion in a high-spin organic triradical molecule*, Nano Letters **16**, 2066.
10. **R. Gaudenzi**, J. O. Island, J. de Bruijkere, E. Burzurí, T. M. Klapwijk, H.S.J. van der Zant (2015) *Superconducting molybdenum-rhenium electrodes for single-molecule transport studies*, Appl. Phys. Lett. **106**, 222602.
11. E. Burzurí, **R. Gaudenzi**, H.S.J. van der Zant (2015) *Observing magnetic anisotropy in electronic transport through individual single-molecule magnets*, J. Phys. Cond. Matter **27**, 113202.
12. R. Frisenda\*, **R. Gaudenzi**\*, C. Franco, M. Mas-Torrent, C. Rovira, J. Veciana, I. Alcon, S. Bromley, E. Burzurí, H.S.J. van der Zant (2015) *Kondo effect in a neutral and stable all organic radical single molecule break junction*, Nano Letters **15**, 3109 – 3114.
13. M. Misiorny, E. Burzurí, **R. Gaudenzi**, K. Park, M. Leijnse, M. R. Wegewijs, J. Paaske, A. Cornia, H.S.J. van der Zant (2015) *Probing transverse magnetic anisotropy by electronic transport through a single-molecule magnet*, Phys. Rev. B **91** 035442.
14. J. Eller, J. Roth, **R. Gaudenzi**, S. Irvine, F. Marone (2013) *Water distribution in GDL near optimal humidification*, ECS Transactions 50.2, 477-486.