Curriculum Vitae – Rocco Gaudenzi

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Personal data

N**ame:** Rocco Gaudenzi

Date and place of birth: 12.12.1987, Bologna, IT

Orcid number: 0000-0002-0762-6351

Languages: Italian (mother tongue), English (full professional proficiency), German (B1), Russian (A2)

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 the role of the electromagnetic potentials in quantum theory from the physics and philosophical standpoint; 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 gas. During my PhD at the Delft Technical University (NL), I used nano-structures to investigate aspects of quantum magnetism, electron transport, superconductivity, and thermodynamics of information. I was then awarded a Rubicon Postdoctoral Fellowship to pursue, at the Max Planck Institute for the History of Science in Berlin, a research on the role of analogical thinking in the cross-disciplinary (condensed-matter and particle physics) and cross-cultural (Europe and Japan) transfer of knowledge. My current research project, which I pursue at the University of Verona (IT) thanks to a Marie Curie Seal of Excellence, concerns the physical foundations of intelligence in living organisms versus machines, and how their respective physical make-up determines fundamental aspects of their intelligence. The broader aim is to build a new philosophical anthropology (in fact, more generally, a *bios*-logy) using machines as a "mirror". In the meantime, I also work as an external collaborator for the Max Planck Institute for Geoanthropology in Jena (DE), where I am involved in organising annual workshops on the history and philosophy of cognitive psychology and computational neuroscience.

Current and past positions

21.12.2022 – Present Junior Researcher, Università di Verona, Verona, IT

31.09.2022 – Present External collaborator, Max Planck Institute for Geoanthropology, Jena, DE

(I am involved as a consultant in the organisation of a series of workshops to be held in the next four years)

01.09.2022 – 31.01.2023 External collaborator, Max Planck Institute for the History of Science, Berlin

01.09.2021 – 31.08.2022 Visiting scholar, Max Planck Institute for the History of Science, Berlin, DE

01.09.2018 – 31.08.2021 Post-doc, Max Planck Institute for the History of Science, Berlin, DE

(This period includes a three-month paternity leave between Jul. 2019 and Sept. 2019 owing to the birth of my daughter and a substantial portion of home-care time due to the closure of day nurseries due to the COVID-19 pandemic)

01.02.2018 – 31.08.2018 Visiting Post-doc, Max Planck Institute for the History of Science, Berlin, DE

Education

16.06.2013 – 26.06.2017 PhD in Physics, Delft University of Technology, Delft, NL; Supervisor: Herre van der Zant, Dissertation title: "Quantum transport phenomena in magnetic molecules"

01.09.2010 – 10.03.2013 MSc in Physics (Overall Grade Point Average 5.63/6), ETH Zurich, Zurich, CH; Supervisor: Thomas Ihn, Dissertation title: "Scanning gate measurements in the integer and fractional quantum hall regimes"

01.09.2006 – 10.10.2009 BSc in Physics (110/110 *magna cum laude*), University Roma Tre, Rome, IT; Supervisor: Roberto Raimondi, Dissertation title: "The Aharonov-Bohm effect and the role of the potentials in quantum theory"; Electives: History of mathematics, Philosophy of physics and biophysics

Teaching activities

Fall 2023, 2024 Core course "Logic and philosophy of science", 6 ECTS, University of Verona, IT

02.2021 – 06.2021 "What's in an analogy? A Journey from the sciences to the humanities and back", 42 hours lecture course, 8 ECTS, Bard College of Liberal Arts, Berlin, DE; role: course designer and lecturer

Fall 2015 Teaching assistantship in *Classical mechanics*, TU Delft, NL; role: assistant

Fall 2014 Teaching assistantship in *Rational mechanics*, TU Delft, NL; role: assistant

Fall 2013 Teaching assistantship in *Rational mechanics*, TU Delft, NL; role: assistant

Supervising and mentoring

05.2024 – Present Co-supervision of the PhD student Matteo Bedetti, Max Planck Institute for Geoanthropology in Jena, DE

02.2024 – 10.2024 Bachelor theses supervision of the following students: Davide Melotti, Ilaria Caiazzo, Martina Collodel, Giorgia DeStefanis, Siria Mascheri, Alessio Simone, Caterina Menegatti

03.2019 – 05.2024, Co-supervision of the PhD student Stefano Furlan, Max Planck Institute for the History of Science

09.2015 – 06.2017 Co-supervision of a PhD Student in physics (Joeri de Bruijckere), TU Delft, NL

08.2014 – 04.2015 Thesis co-supervision of a MSc student in physics (Joeri de Bruijckere), TU Delft, NL

Grants and funding

01.09.2018 – 31.08.2020 Rubicon Postdoctoral grant, Netherlands Organisation for Scientific Research (NWO), grant N.er 019.181SG.010, Project title: "The genesis of concepts in mesoscopic physics and their role in the reductionist search for a unified theory"; role: principal investigator, amount of the grant awarded: about 128k Euros

06.2018 Project grant, European Space Agency's Drop Your Thesis! Programme, Project title: "Graphene-based spacecraft sail for light-induced propulsion"; role: 2nd principal investigator, amount of the grant received: about 50k Euros

06.2023 Swiss National Science Foundation (SNFS) Postdoctoral Fellowship, grant N.er TMPFP1_217158/1, Project title: "Computability, Complexity, and Chaos: Towards a historical epistemology of algorithms"; role: principal investigator, amount of the grant awarded: about 260k Euros

Scholarships and Awards

2006 Giuseppe Occhialini Scholarship for high-school students of honour, Fossombrone, IT

2003 High-school prize for the philosophical essay "Sull'Attività: un dialogo galileiano su fisica e filosofia", Pesaro, IT [On the act: a Galilean dialogue on physics and philosophy]

Organisation of workshops/summer schools

13.11.2023 – 16.11.2023 International workshop on "Shifting Boundaries from Behaviourism to Cognitive Science to Neuroscience" (2nd part of the workshop "Notes from the future. The Jerome Bruner Library at the Max Planck Institute for Psycholinguistics"), Max Planck Institute for Psycholinguistics, Nijmegen, NL & Max Planck Institute for the History of Science, Berlin, DE; role: member of the organising and programme committee

02.10.2023 – 04.10.2023 International workshop "Physics and philosophy between Europe and Japan (1922-1953)", Università Federico II, Napoli, IT; role: member of the programme committee

10.01.2023 – 12.01.2023 International workshop "Physics modelling of thought and the underlying brain mechanisms", Max Planck Institute for the History of Science, Berlin, DE; role: member of the organising and programme committee

12.07.2022 – 14.07.2022 International workshop "Approximation to second order: historical and philosophical perspectives", Max Planck Institute for the History of Science, Berlin, DE; role: member of the programme committee

09.06.2021 – 11.06.2021 International workshop "Approximation in physics: historical and philosophical perspectives", Max Planck Institute for the History of Science, Berlin, DE; role: member of the programme committee

27.03.2019 – 29.03.2019 International workshop "Non-empirical physics from a historical perspective", Max Planck Institute for the History of Science, Berlin, DE; role: member of the programme committee

2018 – 2019 End of June annually, International Summer School *Cortona Week* on Science and Humanities, Todi, IT; role: founding member, and member of the steering and programme committee

Editorial and reviewer work

Co-editor of the series "Max Planck Papers" in the Springer Journal *Human Arenas*

Co-editor for *Philosophies*

Reviewer for: *Physics review letters A, Nanoletters, Human Arenas*, *Scientia*

Membership in committees

Dec 2023 – today History of Cognition Committee, Max Planck Institute for the history of science

Sep 2023 – today Ethical Committee, University of Verona

Sep 2023 – today Collegio Didattico del Corso di Laurea in Scienze della Comunicazione, University of Verona

Some notable participations

22.09.2021 Invited intervener to Sir Roger Penrose's lecture "Forced non-Periodicity in plane tilings: an interplay between mathematics and visual aesthetics", Colloquia of the Accademia di San Luca, Accademia Nazionale di San Luca, Rome, IT. Available online on the channel of the Accademia di San Luca: https://bit.ly/3c8lWrm

30.06.2024 – 05.07.2024 Invited participant to the 70th Lindau Nobel Laureate Meeting, Lindau, DE

Memberships

2024 - Present Italian Society for the History of Science (SISS)

2019 - Present Italian Society for the History of Physics and Astronomy (SISFA)

2019 - Present Italian Society for the Logic and Philosophy of Science (SILFS)

2017 - Present Italian Society for Physics (SIF)

Public lectures and dissemination actions

2023 Lecture "Macchine, specchio dell'umano? Ripartiamo dal 'gioco dell'imitazione'", Collegio Universitario Don Mazza, Verona, IT

2023 Interview for the Journal *Scientia* on the published article "L'artigiano e il rivoluzionario verso una

teoria delle particelle elementari: influenze culturali, divergenze e rincontri", Milan, IT

2022 Lecture "Dare numero, dare nome, dare forma alle cose. Un viaggio di esplorazione nei recessi del linguaggio e della formazione dei concetti", Vallegaudia House-Theatre, Tavullia, IT

2018 Theatrical pièce "Copernico non ci credeva", on the role of Open Data in society, debut: Teatro Piccolo Orologio, Reggio Emilia, IT; Broadcasted on Italian national radio channel (12.10.2019 on radio program "Piazza Verdi", Radio Tre); restaged in several Italian theatres, festivals, and schools (e.g., SEGNI - New Generations Festival Mantova, Oct. 2019); role: screenwriter

2017 Lecture "The road to modern science: the dominant thought and the enlightened combatants. Readings from Copernicus, Bruno and Galilei", Spazio teatrale Mestieri Misti, Pesaro, IT

2015 Lecture "Scales in physics", Spazio teatrale Mestieri Misti, Pesaro, IT

2014 Lecture "The rise of superintelligence?", Spazio teatrale Mestieri Misti, Pesaro, IT

2009 Lecture to high-school students "Ratios in the cosmos", Carlo Bo University, Urbino, IT

Consulting work

Jan 2023 Scientific consultant in the international architecture competition for the design of the Rome Science Museum [Museo della Scienza di Roma] in collaboration with Studio Transit Architecture and Simmetrico S.r.l.

PUBLICATIONS & CONFERENCE PAPERS

(an open access version of the item is uploaded unless otherwise stated)

(in multiple-author publications my name is marked by an asterisk when I have also acted as corresponding author)

Monographs

1. **R. Gaudenzi** (2022). *Historical Roots of Spontaneous Symmetry Breaking. Steps towards an Analogy*, Springer: Cham.

Book Chapters

1. S. Furlan, **R. Gaudenzi** (2024). *John Wheeler, A Seeker in the Atomic Age*, In P. Allen, F. Marcacci (eds). *Angelic Motions, Evil Geniuses, and Explanations: The Theological and Philosophical Backdrop to the Development of the Sciences (1600-2000)*. Brill: Leiden.
2. **R. Gaudenzi** (2024). *Modern physics and philosophy East & West: Nishida, Bohr, and Yukawa*. Tetsugaku Companion to Japanese Philosophy, Springer (in press).
3. S. Furlan, **R. Gaudenzi** (2024). *L'unità incrinata. Heisenberg tra Goethe, pensiero greco e Weltformel*. Valore Italiano Editore (in press).

Journal articles

1. L. Abbott, **R. Gaudenzi*** (2024). "Theoretical Physics and Theoretical Neuroscience: What Each Can Learn from the Other", *Human Arenas*. published online 23 August 2024 https://doi.org/10.1007/s42087-024-00439-w
2. K. Rajan, A. Treves, **R. Gaudenzi*** (2024). "Reflections on simplicity and complexity in Computational Neuroscience", *Human Arenas*, published online 21 June 2024 https://doi.org/10.1007/s42087-024-00423-4
3. **R. Gaudenzi** (2023). "L'artigiano e il rivoluzionario verso una teoria delle particelle elementari: influenze culturali, divergenze e rincontri", *Scientia*, Vol. 1, N. 2 (December 2023).
4. **R. Gaudenzi** (2023). "Yoichiro Nambu and the concept of apparent vacuum: a stepping stone to spontaneous symmetry breaking", *Annalen der Physik* 2023, 535, 2200584 (https://doi.org/10.1002/andp.202200584).
5. S. Furlan, **R. Gaudenzi*** (2022). "The Earth vibrates with Analogies: the Dirac Sea and the Geology of the Vacuum", *Studies in the History and Philosophy of Science 93*, 163-174.
6. P.R. de Olano, J. Fraser, **R. Gaudenzi**, A. Blum (2022). "Taking Approximation seriously: The Cases of the Chew and Nambu-Jona-Lasinio Models", *Studies in the History and Philosophy of Science 93*, 82-95.
7. **R. Gaudenzi** (2019). "Entropy? Exercices de style", *Entropy*, *21*, 742-762.
8. 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 SrIrO3", *The European Physical Journal, 135*, 627.
9. **R. Gaudenzi**, D. Stefani, S. Cartamil-Bueno (2020). "Light-induced propulsion of graphene-on-grid sails in microgravity", *Acta Astronautica, 174*, 204-210 (not open access).
10. 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.
11. **R. Gaudenzi***, E. Burzuri, S. Maegawa, H.S.J. van der Zant, F. Luis (2018). "Quantum Landauer erasure with a molecular nanomagnet", *Nature Physics, 14*, 565–568.
12. 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) LaAlO3 / SrTiO3 interface", *Physical Review B, 96*, 020504.
13. **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.
14. 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", *Physical Review Letters, 118*, 117001.

15. **R. Gaudenzi***, M. Misiorny, E. Burzurí, M. R. Wegewijs, H.S.J. van der Zant (2017). "Transport mirages in single-molecule devices", *Journal of Chemical Physics, 146*, 092330.

16. **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.

17. **R. Gaudenzi***, J. O. Island, J. de Bruijckere, E. Burzurí, T. M. Klapwijk, H.S.J. van der Zant (2015). "Superconducting molybdenum-rhenium electrodes for single-molecule transport studies", *Applied Physics Letters, 106*, 222602.

18. E. Burzurí, **R. Gaudenzi**, H.S.J. van der Zant (2015). "Observing magnetic anisotropy in electronic transport through individual single-molecule magnets", *Journal of Physics Condensed Matter, 27*, 113202 (not open access).

19. 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.

20. 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", *Physical Review B, 91,* 035442.

21. J. Eller, J. Roth, **R. Gaudenzi**, S. Irvine, F. Marone (2013). "Water distribution in GDL near optimal humidification", *ECS Transactions, 50(*2), 477-486 (not open access).

Conference proceedings (peer-reviewed)

1. **R. Gaudenzi***, S. Furlan (2022). "Looking stereoscopically at Goethe vs. Newton: Heisenberg and Pauli on the future of physics", *Proceedings of the 41th Annual conference of the Italian Society for the History of Physics and Astronomy*, Pisa University Press, 190-196.

2. S. Furlan, G. Carini, **R. Gaudenzi** (2021). "Tales from Dubna's Oakwood: Bogoliubov, Pontecorvo, and the JINR Seminars", *Proceedings of the 40th Annual Conference of the Italian Society for the History of Physics and Astronomy*, 155-161, Pisa University Press.

3. S. Furlan, **R. Gaudenzi*** (2021). "Far from the Particle Crowd: *Shugyosha* Nambu and *Michizane* Wheeler", *Proceedings of the 40th Annual Conference of the Italian Society for the History of Physics and Astronomy*, 147-153, Pisa University Press.

4. **R. Gaudenzi** (2020). "Prolegomena to a Study on Analogy in Modern Physics: the Case of Spontaneous Symmetry Breaking", *Proceedings of the 39th Annual Conference of the Italian Society for the History of Physics and Astronomy*, 245- 251, Pisa University Press.

Presented conference papers (selected list)

1. R. Gaudenzi (2024). "Modern physics and philosophy East and West: Bohr and Nishida", 2024 World Congress of Philosophy, Rome, IT.

2. R. Gaudenzi (2024). “Physical reality according to Bohr and intelligence according to Turing: an epistemological parallel”, Congress of the Italian Society for the History of Science (SISS), Bari, IT
3. R. Gaudenzi (2023). “Behaviourism, chaos, and continuity: a physicist re-reads Turing’s imitation game”, Triennial Conference of the Italian Society for Logic and Philosophy of Science (SILFS), Urbino, Italy, IT.
4. R. Gaudenzi, S. Furlan (2021). “Seeking for a new intuition in dialogue with Goethe and Newton: Heisenberg’s answer to the ‘crisis’ of science”, 41st Congress of the Italian Society for the History of Physics and Astronomy, Arezzo, IT.
5. R. Gaudenzi (2021). “Goethe *ab omni naevo vindicatus (fere)*: 20th-century physicists reread Goethe vs. Newton”, 26th International Congress of the History of Science and Technology (ICHST), Prague, CZ.
6. R. Gaudenzi, S. Furlan (2021) “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.
7. R. Gaudenzi (2020) “Analogies as visual tools in nuclear and particle physics”, Conference of the European Society for the History of Science (ESHS), Bologna, IT.
8. R. Gaudenzi (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.
9. R. Gaudenzi (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.
10. R. Gaudenzi, E. Burzuri, S. Maegawa, H.S.J. van der Zant, F. Luis (2017). “Reaching the Landauer limit at high-speed with a quantum nanomagnet”, American Physical Society (APS) March Meeting, New Orleans, USA.
11. R. Gaudenzi, J. O. Island, 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). “Superconducting proximity-induced Shiba states in an organic molecular junction”, Physics Congress of the Dutch Organisation for Scientific Research (NWO), Veldhoven, NL.
12. R. Gaudenzi (2016). “Playing cards with Maxwell's devil: thermodynamic limits in computation”, ECMOLS Spintronics Conference, Bologna, IT.

Invited talks

1. 06.09.2024 “Quantum physics, Japanese philosophy and phenomenology: a mutual illumination” (presented together with John Sykes), 8th Annual Conference of the European Network of Japanese Philosophy, Tallinn University, Tallinn, Estonia, EE.
2. 06.12.2023 “Conoscere e agire: per una rilettura storico-critica del gioco dell’imitazione di Alan Turing”, Seminari di Filosofia, Casa della Cultura, Milano, IT.
3. 03.10.2023 “The craftsman and the designer towards a theory of elementary particles -- cultural influences, divergences, and encounters of the two souls of Japanese physics”, International conference *Physics and Philosophy between Europe and Japan 1922-1953*, University of Naples Federico II, Naples, IT.

4. 03.07.2023 “Analogies in the conceptualisation of the physical world: A *Glasperlenspiel* of geometry and inventiveness”, Toeplitz-Kolloquium for Education and History of Mathematics, Bonn University, Bonn, DE.
5. 18.01.2023 “L’unità incrinata. Heisenberg tra Goethe, pensiero greco e *Weltformel*” [The cracked unity. Heisenberg between Ancient Greek thought and the Weltformel], Ciclo Seminariale su storia e filosofia della scienza: tradizioni storiografiche e prospettive epistemologiche [Seminar cycle on the history and philosophy of science: historiographical traditions and epistemological perspectives], University of Piemonte Orientale, Varese, IT.
6. 22.11.2022 “Rigore e fantasia: il pensiero analogico nella scienza e nell’arte” [Rigour and fantasy: analogical thinking in the sciences and the arts], *Lectio Magistralis*, Accademia Nazionale di San Luca, Rome, IT.
7. 09.06.2022 Discussion of various chapters of my monograph “Historical roots of spontaneous symmetry breaking”; philosophy of physics reading group, University of Durham, UK (held online).
8. 18.05.2022 “The twists and turns of an analogy: conceptual cross-fertilisations in the discovery of spontaneous symmetry breaking”, Oberseminar zur Geschichte der Mathematik und der Naturwissenschaften [Graduate Seminars in the History of Mathematics and Sciences], University of Mainz Johannes Gutenberg, DE.
9. 12.05.2022 Presentation of my monograph “Historical roots of spontaneous symmetry breaking”, philosophy of physics reading group, University of Durham, UK (held online).
10. 17.03.2022 “The seed of modern physics in Japan and its fruits”, Advisory Board Meeting 2022, Special Focus Session on cultural comparisons and global history, Max Planck Institute for the History of Science, Berlin, DE.
11. 26.10.2021 “The vacuum of quantum field theory and the protean demon of analogy”, Seminars of the ERC project “Paradoxes and Metaphors of Time in Early Universe(s)”, University of Milan, IT (held online).
12. 17.09.2021 “Spontaneous symmetry breaking and the long course of an analogy: concepts and languages of physics meet”, 107th National Congress of the Italian Society for Physics, University of Pisa, IT (held online).
13. 12.11.2015 “Magnetism in individual molecules, electrons and Cooper pairs”, Chalmers University (Theoretical physics department), Gothenburg, SV.
14. 23.03.2015 “Future directions in transport through single-molecule magnets”, Delft-Copenhagen Workshops, University of Copenhagen, DK.