

Le dichiarazioni nel presente curriculum vitae corrispondono a verità, ai sensi degli artt. 46 e 47 del D.P.R. 445/2000.

Personal data

Name **Giovanna Marcelli**

Nationality **Italian**

Current position

1 December 2023 – **Assistant Professor (Ricercatore a Tempo Determinato, tipo "A") at the Department of Mathematics and Physics of Roma Tre University, Italy** .
Within the team of Prof. Alessandro Giuliani

Past position

1 Jan. 2023 – **Postdoc at the Department of Mathematical Sciences of Aalborg University, Denmark**
30 Nov. 2023 .

Supervisors: Prof. Horia D. Cornean and Prof. Jesper Møller

16 Apr. 2020 – **Postdoc at Scuola Internazionale Superiore di Studi Avanzati (SISSA), Trieste, Italy** .
– 31 Dec. 2022
Supervisor: Prof. Marcello Porta

01 Apr. 2018 – **Postdoc at Eberhard Karls Universität Tübingen, Germany** .
– 31 Mar. 2020
Supervisor: Prof. Stefan Teufel

Education

Nov. 2014 – **Ph.D. in Mathematics**, University of Rome, "La Sapienza".

Feb. 2018 Thesis defence: 27 February 2018.

Title: "A mathematical analysis of spin and charge transport in topological insulators".

Supervisor: Prof. Gianluca Panati (University of Rome, "La Sapienza").

Referees: Prof. Eric Cancès (Ecole des Ponts ParisTech, INRIA Paris) and Prof. Benjamin Schlein (Universität Zürich).

Committee: Prof. Eric Cancès (Ecole des Ponts ParisTech, INRIA Paris), Prof. Domenico Finco (Università Telematica Internazionale Uninettuno) and Prof. Alessandro Teta (University of Rome, "La Sapienza").

Oct. 2016 – **Erasmus + (Ph.D. level)**, Host Institution: Eberhard Karls Universität Tübingen.

Mar. 2017 Title of the project: "Adiabatic theorems and application to quantum spin Hall effect".

Supervisor at the mobility destination: Prof. Stefan Teufel.

Oct. 2012 – **Master Degree in Mathematics**, within the study program "Probability and Mathematical
Oct. 2014 Physics", University of Rome, "La Sapienza".

Title: "Metodi di Bloch–Floquet per il Laplaciano ergodico".

Supervisors: Prof. Gianluca Panati and Prof. Adriano Pisante (University of Rome, "La Sapienza").

Final mark: 110/110 cum laude.

April 2015 **Certificate of Excellent Graduate at the Faculty of Mathematical, Physical and Natural Sciences**, Academic year 2013-2014, University of Rome, "La Sapienza".

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🏠 [homepage](#)

- Oct. 2009 – **Bachelor Degree in Mathematics**, University of Rome, “La Sapienza”.
- Oct. 2012 Title: “Analogie fra la Meccanica classica e l'Ottica geometrica”.
Supervisor: Prof. Gianluca Panati (University of Rome, “La Sapienza”).
Final mark: 110/110 cum laude.
- Oct. 2010 – **Certificate of completion of study program at the University School of Excellence**,
Oct. 2012 *administrated by “Fondazione Tullio Levi-Civita” and “International Research Center for Mathematics & Mechanics of Complex System” of University of L'Aquila*, in Cisterna di Latina (Latina), Italy.
Coordinator: Prof. Alberto Maria Bersani (University of Rome, “La Sapienza”).
Final mark: Excellent.
- Sept. 2004 – **High School Degree**, *Liceo Scientifico (Piano Nazionale Informatica (PNI))*, “Guglielmo
July 2009 *Marconi”*, Colleferro (Rome), Italy.
Final mark: 100/100 cum laude.
- August 2008 **University orientation course**, *one-week course*, (participation reserved to the two most proficient students in each high school), Scuola Normale Superiore di Pisa, Italy.

Qualifications

- Feb. 2022 – **Qualification aux fonctions de Maître de conférences**, *Section 25 - “Mathématiques” (qual. n. 22225372883) & Section 26 - “Mathématiques appliquées et applications des mathématiques” (qual. n. 22226372883)*, France.

Teaching

Completed and in progress:

The course name written in bold contains a link to its corresponding course webpage.

- Novembre 2024 – **Istituzioni di Fisica Matematica**, *Bachelor and master course at the Department of Mathematics and Physics*, Roma Tre University.
- Gennaio 2025 Duration: 30 hours.
- Ottobre 2024 **Matematica II per Geologia**, *Bachelor course at the Department of Mathematical Sciences*,
– Gennaio 2025 Roma Tre University.
Duration: 12 hours.
- April 2024 – **Complementi di Meccanica Analitica - Modulo B**, *Bachelor and master course at the*
June 2024 *Department of Mathematics and Physics*, Roma Tre University.
Duration: 26 hours.
- Dec. 2023 – **Istituzioni di Fisica Matematica**, *Bachelor and master course at the Department of Mathe-*
Jan. 2024 *matics and Physics*, Roma Tre University.
Duration: 20 hours.
- Dec. 2023 – **Matematica II per Geologia**, *Bachelor course at the Department of Mathematical Sciences*,
Jan. 2024 Roma Tre University.
Duration: 12 hours.
- November 2023 **Adiabatic perturbation theory in quantum dynamics**, *Ph.D. course at the Department of*
Mathematical Sciences, Aalborg University.
Duration: 15 hours.
- Oct. 2019 – **Exercise Classes for “Mathematical Quantum Theory”**, *Master in Mathematical Physics*
Feb. 2020 *Program*, Eberhard Karls Universität Tübingen.
Duration^(*): 30 hours.
- October 2019 **Preparatory Course for the Master in Mathematical Physics Program**, Eberhard Karls
Universität Tübingen.
Duration^(*): 60 hours.

- Apr. 2019 – **Exercise Classes for “Linear Algebra”**, *Bachelor of Science*, Eberhard Karls Universität Tübingen.
 July 2019 Duration(*): 60 hours.
- Oct. 2018 – **Exercise Classes for “Geometry in Physics”**, *Master in Mathematical Physics Program*, Eberhard Karls Universität Tübingen.
 Feb. 2019 Duration(*): 30 hours.
- October 2018 **Preparatory Course for the Master in Mathematical Physics Program**, Eberhard Karls Universität Tübingen.
 Duration(*): 30 hours.
- Apr. 2018 – **Exercise Classes for “Non-Linear Dispersive Partial Differential Equations”**, *Master in Mathematical Physics Program*, Eberhard Karls Universität Tübingen.
 July 2018 Duration(*): 30 hours.
- May 2016 **Istituzioni di Fisica Matematica**, *Master in Mathematics*, University of Rome, “La Sapienza”.
 Two two-hour lectures to conclude the course taught by Prof. Mario Pulvirenti. Duration: 4 hours.
- September 2015 **Preparatory Course in Mathematics**, *Faculty of Information Engineering, Informatics, and Statistics*, University of Rome, “La Sapienza”.
 Duration: 24 hours.
- Scheduled:**
- April 2025 – **Complementi di Meccanica Analitica - Modulo B**, *Bachelor and master course at the Department of Mathematics and Physics*, Roma Tre University.
 June 2025 Duration: 18 hours.
- Pedagogical merits:**
- Academic years: 2018–2020 **Teaching certificate with pedagogical merits:** [download here](#), *For the teaching duties at the University of Tübingen, Germany.*

(*) This duration does not include the time used both for grading the solutions written weekly by each student and the office hours.

Supervision and mentoring for students

- Academic year 2019-2020 **Mentor:** for the student Paul Hege of Master degree in Mathematics, thesis in Mathematical Physics on adiabatic space-time theory for non-interacting fermions with supervisor Prof. Stefan Teufel. To date Paul Hege is a Ph.D. student at the University of Tübingen, Germany.
- Academic year 2022-2023 **Mentor:** for the student Lorenzo Pigozzi of Master degree in Mathematics, thesis in Mathematical Physics on quantum transport in the case of semi-metals for non-interacting fermions with supervisor Prof. Marcello Porta. To date Lorenzo Pigozzi is a Ph.D. student at Institute of Science and Technology, Austria
- Academic year 2023-2024 **Co-supervisor:** for the student Cecilia Pietropaoli of Master degree in Mathematics, thesis in Mathematical Physics with title *Adiabatic perturbation theory applied to the hydrogen atom: a comparison of alternative methods* with supervisor Prof. Gianluca Panati. To date Cecilia Pietropaoli is a Ph.D. student at SISSA, Trieste.

Grants

- March 2024–December 2024 **Department of Mathematics and Physics funds:** within the University of Roma Tre for *funding support for research*

- February 2021– July 2022 **Progetto Giovani GNFM 2020**: “Correnti di spin in presenza di interazioni spin-orbita e campi magnetici”, jointly with Domenico Monaco, funded by: INdAM–GNFM.
- 2016 August **Start-up research funds** for the project: “Adiabatic theorems and application to quantum spin Hall effect”, University of Rome, “La Sapienza”.
- 2016 March **Erasmus + mobility fellowship (Ph.D. level)** for the project: “Adiabatic theorems and application to quantum spin Hall effect”, University of Rome, “La Sapienza”. Mobility destination: Eberhard Karls Universität Tübingen, Germany and supervisor at the mobility destination: Prof. Stefan Teufel.
- 2014 October **Ph.D. fellowship**, University of Rome, “La Sapienza”.
- Oct. 2010 – Oct. 2012 **Fellowship** at University school of excellence, administrated by “Fondazione Tullio Levi–Civita” and “International Research Center for Mathematics & Mechanics of Complex System” of University of L’Aquila (Coordinator: Prof. Alberto Maria Bersani (University of Rome, “La Sapienza”)).
- 2010 January **“Anna Norvano” fellowship**, reserved to the most proficient students in the scientific high school “Guglielmo Marconi”, awarded by Comune di Colferro (Rome).

Research

- Research field **Mathematical physics** *I am interested in mathematical problems related to Quantum Mechanics, arising mostly from condensed matter physics. In particular, analysis of the transport properties of observable quantities, e.g. charge or spin, with universality feature for a relevant class of models in quantum systems, in presence or absence of phase transitions.*
- Research experience **Mathematical physics** *During my Ph.D. and first postdoc I have consolidated my competencies in mathematical methods of one-body quantum mechanics and non-equilibrium quantum evolution. In the second postdoc I have enhanced my knowledge and competencies in mathematical methods of many-body quantum mechanics and renormalization group. In the third postdoc I have strengthened my competencies in scattering theory, non-linear quantum evolution systems, and ergodic and probability theory.*

Publications

1. **On the Self-Consistent Landauer–Büttiker Formalism** (con H. D. Cornean). Commun. Math. Phys. (2024).
<https://link.springer.com/article/10.1007/s00220-024-05059-7>.
2. **Adiabatic evolution of low-temperature many-body systems** (con R. L. Greenblatt, M. Lange and M. Porta). Commun. Math. Phys. (2024).
<https://link.springer.com/article/10.1007/s00220-023-04903-6>.
3. **Localization of generalized Wannier bases implies Chern triviality in non-periodic insulators** (with Massimo Moscolari and Gianluca Panati). Ann. Henri Poincaré (2023).
<https://doi.org/10.1007/s00023-022-01232-7>.
4. **Purely linear response of the quantum Hall current to space-adiabatic perturbations** (with Domenico Monaco). Lett. Math. Phys. (2022).
<https://doi.org/10.1007/s11005-022-01574-7>.
5. **From charge to spin: analogies and differences in quantum transport coefficients** (with Domenico Monaco). J. Math. Phys. (2022).
<https://doi.org/10.1063/5.0089786>.

6. **Improved energy estimates for a class of time-dependent perturbed Hamiltonians.** Lett. Math. Phys. (2022).
<https://doi.org/10.1007/s11005-022-01543-0>.
7. **A new approach to transport coefficients in the quantum spin Hall effect** (with Gianluca Panati and Stefan Teufel). Ann. Henri Poincaré (2021).
<https://doi.org/10.1007/s00023-020-00974-6>.
8. **Spin conductance and spin conductivity in topological insulators: analysis of Kubo-like terms** (with Gianluca Panati and Clément Tauber). Ann. Henri Poincaré (2019).
<https://doi.org/10.1007/s00023-019-00784-5>.
9. **The Haldane model and its localization dichotomy** (with Domenico Monaco, Massimo Moscolari and Gianluca Panati). Rend. Mat. Appl. **39**, Issue 2 (2018), 307–327.
[http://www1.mat.uniroma1.it/ricerca/rendiconti/ARCHIVIO/2018\(2\)/307-327.pdf](http://www1.mat.uniroma1.it/ricerca/rendiconti/ARCHIVIO/2018(2)/307-327.pdf).
 Extended preprint at arXiv:1909.03298.

Preprints

10. **Exact linearity of the macroscopic Hall current response in infinitely extended gapped fermion systems** (con M. Wesle T. Miyao, D. Monaco e S. Teufel.). Preprint available at arXiv:2411.06967 (2024).

Works in progress

Consulta qui di seguito: la mia pagina arXiv.

11. **Longitudinal conductivity at Hall topological phase transitions** (con Lorenzo Pigozzi e Marcello Porta).
12. **Spectral and dynamical results related to certain non-integer base expansions on the unit interval** (con Horia D. Cornean e Ira Herbst).
13. **Spin transport and its non-universality in the AII class on the honeycomb structure** (con Luca Fresta).

Scientific communications

The names of the conferences/workshops contain a link to their corresponding webpages.

Invited talks

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|-------------------------|---|
| 30 July - 1 August 2024 | Solid Math 2024 , Universität Tübingen.
Title of the talk: <i>On the self-consistent Landauer–Büttiker formalism</i> . |
| 25-26 July 2024 | AMS-UMI International Joint Meeting 2024-Special Session: Functional Analytic Methods in Quantum Many-Body Theory , Università di Palermo.
Title of the talk: <i>Adiabatic evolution of low-temperature many-body quantum systems</i> . |
| 27-31 May 2024 | Conference: Quantum Statistical Mechanics , Institut de Mathématiques de Toulouse.
Title of the talk: <i>On the self-consistent Landauer–Büttiker formalism</i> . |
| 20-21 May 2024 | Workshop: Random Number Representations, Stochastic Processes, and Quantum Transport , Aalborg University.
Title of the talk: <i>On the self-consistent Landauer–Büttiker formalism</i> . |
| 9 April 2024 | Séminaires in Probabilités, Physique Mathématique et Analyse , Université d'Angers.
Title of the talk: <i>On the self-consistent Landauer–Büttiker formalism</i> . |
| 27 March 2024 | Series of seminars in Mathematical Physics , University of Roma Tre, Department of Mathematics and Physics.
Title of the talk: <i>On the self-consistent Landauer–Büttiker formalism</i> . |

- 31 January 2024 **Physics & Topology**, La Sapienza, University of Rome, Department of Physics.
Title of the talk: *Transport coefficients in quantum spin Hall systems and their relation with spin-Chern numbers.*
- 30 October 2023 **Munich-Copenhagen-Santiago Seminar in Mathematical Physics**, online.
Title of the talk: *Adiabatic evolution of low-temperature many-body quantum systems.*
- 7 July 2023 **29-th Nordic Congress of Mathematicians**, University of Aalborg, Denmark.
Title of the talk: *Adiabatic evolution of low-temperature many-body quantum systems.*
- 14 June 2023 **Mathematical physics seminars**, University of Rome, La Sapienza.
Title of the talk: *Adiabatic evolution of low-temperature many-body quantum systems.*
- 24 May 2023 **Mathematical physics seminars**, University of Helsinki, Finland.
Title of the talk: *Adiabatic evolution of low-temperature many-body quantum systems.*
- 6–9 Sep. 2022 **Solid Math 2022: Mathematical and numerical methods for solid-state physics**, SISSA, Trieste, Italy.
Title of the talk: *Purely linear response of the quantum Hall current to space-adiabatic perturbations.*
- 20–24 June 2022 **Workshop on Quantum Hall Effect and Topological Phases**, IRMA, Strasbourg & Institute of Advanced Studies of the University of Strasbourg.
Title of the talk: *Purely linear response of the quantum Hall current to space-adiabatic perturbations.*
- 7 April 2022 **Oberseminar Mathematical Physics**, Tuebingen University, Department of Mathematics.
Title of the talk: *A new approach to transport coefficients in the quantum spin Hall effect and to purely linear response of the quantum Hall current.*
- 31 March 2022 **Series of online seminars in Mathematical Challenges in Quantum Mechanics.**
Title of the talk: *Gentle introduction to adiabatic perturbation theory.*
- 30 March 2022 **Seminar series in the condensed matter theory group**, KTH Royal Institute of Technology, Stockholm University and Nordita, Stockholm.
Title of the talk: *A new approach to transport coefficients in the quantum spin Hall effect and to purely linear response of the quantum Hall current.*
- 20–22 December 2021 **Quantum before Christmas: Mathematical Physics from Many-Body Quantum Systems to Normal Forms**, Università degli Studi di Milano & Politecnico di Milano.
Title of the talk: *A new approach to purely linear response of the quantum Hall current and to transport coefficients in the quantum spin Hall effect.*
- 10 December 2021 **Séminaire Physique mathématique ICJ**, Institut Camille Jordan, Lyon.
Title of the talk: *A new approach to transport coefficients in the quantum spin Hall effect and to purely linear response of the quantum Hall current.*
- 25–27 August 2021 **Solid Math 2021: Mathematical and numerical methods for solid-state physics**, Écoles des Ponts, Marne la Vallée.
Title of the talk: *A new approach to transport coefficients in the quantum (spin) Hall effect.*
- 9–13 August 2021 **Learning from insulators: new trends in the study of conduction properties of metals**, Leiden University, Lorentz Center, Oort.
Title of the talk: *A new approach to transport coefficients in the quantum (spin) Hall effect.*
- 25–28 July 2021 **Topological phases of matter**, ETH Zürich, Institute for Theoretical Physics, Leysin.
Title of the talk: *A new approach to transport coefficients in the quantum (spin) Hall effect.*
- 11 May 2021 **SISSA for schools**, SISSA, online.
Participation in “SISSA for schools”, which aims to promote SISSA high quality research and lively international status to the younger generation.
- 17–28 May 2021 **Conference on Mathematical Aspects of Materials Science**, SIAM, Basque center for applied mathematics, online.
Title of the talk: *A new approach to transport coefficients in the quantum spin Hall effect.*
- 5 March 2021 **Cossa xe...? Seminar**, SISSA, Mathematics Area.
Title of the talk: *The integer quantum Hall effect and the Kubo formula.*

- 23 February 2021 **Analysis and Mathematical physics seminars 2020-2021**, SISSA, Mathematics Area.
Title of the talk: *A new approach to transport coefficients in the quantum spin Hall effect.*
- 3-4 February 2020 **Noncommutative Geometry, Analysis, and Topological Insulators**, Leiden University, Mathematisch Instituut.
Title of the talk: *A new approach to transport coefficients in the quantum (spin) Hall effect.*
- 4-5 July 2019 **Tübingen-Zürich Meeting in Mathematical Physics**, Eberhard Karls Universität Tübingen, Department of Mathematics.
Title of the talk: *Non-equilibrium almost-stationary states and linear response for gapped non-interacting quantum systems.*
- 15 April 2019 **Stuttgart-Tübingen GRK-Seminar**, Universität Stuttgart, Department of Mathematics.
Title of the talk: *Improved energy estimates for a class of perturbed Hamiltonian.*
- 3-6 Sept. 2018 **Recent progress in mathematics of topological insulators**, ETH Zürich.
Title of the talk: *Quantum (spin) Hall conductivity: Kubo-like formula (and beyond).*
- 1-3 August 2018 **SOLID MATH 2018**, McGill University, Montréal (Canada).
Title of the talk: *Derivation of a Kubo-like formula for charge and spin transport.*
- 8-10 July 2015 **Trails in Quantum Mechanics and Surroundings 2015**, Università dell'Insubria, Como (Italy).
Title of the talk: *The analogies between prototypes of periodic Schrödinger operators via Bloch-Floquet methods and the ergodic Laplacian.*
- Contributed talks**
- 31 May 2022 **Reading seminar on the Renormalization Group**, based on Giuliani et al. in *J. High Energ. Phys.* 2021, 26, SISSA, Trieste, Mathematics Area.
Title of the talk: *Determinant bounds for fermionic expectations (part II).*
- 25 May 2022 **Reading seminar on the Renormalization Group**, based on Giuliani et al. in *J. High Energ. Phys.* 2021, 26, SISSA, Trieste, Mathematics Area.
Title of the talk: *Determinant bounds for fermionic expectations (part I).*
- 2-7 August 2021 **XX International Congress on Mathematical Physics**, Geneva (Switzerland).
Title of the talk: *A new approach to transport coefficients in the quantum (spin) Hall effect.*
- 16-20 Sept. 2019 **Quantum Transport and Universality, From Topological Materials to Quantum Hydrodynamics**, Università degli Studi Roma Tre, Dipartimento di Matematica e Fisica.
Title of the talk: *Non-equilibrium almost-stationary states and linear response for gapped non-interacting quantum systems.*
- 12-16 August 2019 **QMath14: Mathematical Results in Quantum Physics**, Aarhus University, Department of Mathematics.
Title of the talk: *Non-equilibrium almost-stationary states and linear response for gapped non-interacting quantum systems.*
- 23-28 July 2019 **XIX International Congress on Mathematical Physics**, Centre Mont Royal, Montréal (Canada).
Title of the talk: *Spin conductance and spin conductivity in topological insulators: analysis of Kubo-like terms.*
- 20-21 July 2019 **Young Researchers Symposium**, McGill University, Montréal (Canada).
Title of the talk: *Spin conductance and spin conductivity in topological insulators: analysis of Kubo-like terms.*
- 21-27 April 2019 **Mathematical Methods in Quantum Molecular Dynamics**, MFO, Oberwolfach Research Institute for Mathematics, (Germany).
Title of the talk: *Quantum (spin) Hall conductivity: Kubo-like formula (and beyond).*

Recent scientific visits

- 22-29 August 2024 Scientific collaboration with Prof. Horia D. Cornean, *Aalborg University*, (Denmark).
- 8-12 April 2024 Scientific collaboration with Prof. Clotilde Fermanian, *University of Angers*, (France).
- 1-21 Nov. 2023 Scientific collaboration with Prof. Ira Herbst, *Department of Mathematics, University of Virginia*, (United States).
- 12-16 June 2023 Scientific collaboration with Domenico Monaco, *Department of Mathematics, University of Rome "La Sapienza"*, (Italy).
- 22-26 May 2023 Scientific collaboration with Sebastiano Peotta, *Quantum Dynamics Group, Aalto University*, (Finland).
- 1-10 May 2023 Scientific collaboration with Prof. Ira Herbst, *Department of Mathematics, University of Virginia*, (United States).

Organization of scientific events

- Co-organizer **Conference: *Trails in Quantum Mechanics and surroundings***, SISSA, Trieste, Italy, 8-10 February 2023.

Service to the scientific community, professional affiliations and other scientific activities

- Reviewer Journal of Mathematical Physics, Reviews in Mathematical Physics.
- 2015 – National Affiliation: Gruppo Nazionale per la Fisica Matematica, Istituto Nazionale di Alta Matematica (GNFM–INdAM). Unità di ricerca INdAM: Dipartimento di Matematica e Fisica dell'Università di Roma Tre.
- 2022 – International Affiliation: International Association of Mathematical Physics (IAMP).
- April 2022 Contribution to the IAMP News Bulletin: "*Voices of women in mathematical physics: A series of five interviews*" (with G. Basti, C. Boccato, L. Bossmann, S. Cenatiempo, E. Giacomelli, and S. Rademacher).

Spoken languages

- Italian **Mother tongue**
- English **Fluent**

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