

Luca Marchetti

Curriculum Vitæ

8 Wilmot Street
E3B 2M8, Fredericton, Canada

☎ Available on request

✉ luca.marchetti@unb.ca

📄 marchetti-luca.github.io/

🌐 [marchetti-luca](https://marchetti-luca.github.io/)



Research interests

Emergence of continuum physics from quantum gravity.

More precisely, I am interested in the following research directions:

- ▷ Classical and quantum cosmology;
- ▷ Classical and quantum black hole physics and spacetime thermodynamics;
- ▷ Quantum gravity phenomenology;
- ▷ Relational physics in classical and quantum gravity;
- ▷ Renormalization in quantum gravity: phase structure and universality aspects.

Employment

2023 - 2025 **Postdoctoral Fellowship**, *Department of Mathematics and Statistics, UNB Fredericton.*
(Co-funded by UNB and AARMS.)

2022 **Postdoctoral Fellowship**, *Arnold Sommerfeld Center, LMU Munich.*
(Funded by Fondazione Angelo della Riccia.)

Education

2018 - 2022 **Cotutelle Ph.D. in Physics**, *University of Pisa – LMU Munich, (Cum Laude).*

Thesis title: “Emergent Continuum Physics from Quantum Gravity”.

Supervisors: Dr. G. Cella (INFN Pisa), Dr. D. Oriti (ASC, LMU Munich).

2015 - 2018 **Master’s Degree in Theoretical Physics**, *University of Pisa, (110L/110).*

Thesis title: “Using correlations to experimentally search for quantum gravity effects”.

Supervisor: Dr. G. Cella (INFN Pisa).

2012 - 2015 **Bachelor’s Degree in Physics**, *University of Pisa, (110L/110).*

Thesis title: “Quantum Mechanics in curved spaces”.

Supervisors: Prof. K. Konishi (University of Pisa).

List of publications

- [1] Alexander F. Jercher, Luca Marchetti, and Andreas G. A. Pithis. *Scalar Cosmological Perturbations from Quantum Gravitational Entanglement*. Submitted to Phys. Rev. Lett. Oct. 2023. arXiv: [2310.17549](https://arxiv.org/abs/2310.17549) [gr-qc].
- [2] Alexander F. Jercher, Luca Marchetti, and Andreas G. A. Pithis. *Scalar Cosmological Perturbations from Quantum Entanglement within Lorentzian Quantum Gravity*. Submitted to JCAP. Aug. 2023. arXiv: [2308.13261](https://arxiv.org/abs/2308.13261) [gr-qc].
- [3] Luca Marchetti, Daniele Oriti, Andreas G. A. Pithis, and Johannes Thürigen. “Mean-Field Phase Transitions in Tensorial Group Field Theory Quantum Gravity”. In: *Phys. Rev. Lett.* 130.14 (2023), p. 141501. DOI: [10.1103/PhysRevLett.130.141501](https://doi.org/10.1103/PhysRevLett.130.141501). arXiv: [2211.12768](https://arxiv.org/abs/2211.12768) [gr-qc].
- [4] Luca Marchetti, Daniele Oriti, Andreas G. A. Pithis, and Johannes Thürigen. “Phase transitions in TGFT: a Landau-Ginzburg analysis of Lorentzian quantum geometric models”. In: *JHEP* 02 (2023), p. 074. DOI: [10.1007/JHEP02\(2023\)074](https://doi.org/10.1007/JHEP02(2023)074). arXiv: [2209.04297](https://arxiv.org/abs/2209.04297) [gr-qc].

- [5] Luca Marchetti and Daniele Oriti. “Effective dynamics of scalar cosmological perturbations from quantum gravity”. In: *JCAP* 07.07 (2022), p. 004. DOI: [10.1088/1475-7516/2022/07/004](https://doi.org/10.1088/1475-7516/2022/07/004). arXiv: [2112.12677](https://arxiv.org/abs/2112.12677) [gr-qc].
- [6] Luca Marchetti, Daniele Oriti, Andreas G. A. Pithis, and Johannes Thürigen. “Phase transitions in tensorial group field theories: Landau-Ginzburg analysis of models with both local and non-local degrees of freedom”. In: *JHEP* 21 (2021), p. 201. DOI: [10.1007/JHEP12\(2021\)201](https://doi.org/10.1007/JHEP12(2021)201). arXiv: [2110.15336](https://arxiv.org/abs/2110.15336) [gr-qc].
- [7] Luca Marchetti and Giancarlo Cella. *Impact of a modified Entropy-Area law on Schwarzschild-de Sitter metric*. Oct. 2021. arXiv: [2110.15325](https://arxiv.org/abs/2110.15325) [gr-qc].
- [8] Steffen Gielen, Luca Marchetti, Daniele Oriti, and Axel Polaczek. “Effective cosmology from one-body operators in group field theory”. In: *Class. Quant. Grav.* 39.7 (Jan. 2022), p. 075002. DOI: [10.1088/1361-6382/ac5052](https://doi.org/10.1088/1361-6382/ac5052). arXiv: [2110.11176](https://arxiv.org/abs/2110.11176) [gr-qc].
- [9] Luca Marchetti and Daniele Oriti. “Quantum fluctuations in the effective relational GFT cosmology”. In: *Front. Astron. Space Sci.* 8 (2021), p. 683649. DOI: [10.3389/fspas.2021.683649](https://doi.org/10.3389/fspas.2021.683649). arXiv: [2010.09700](https://arxiv.org/abs/2010.09700) [gr-qc].
- [10] Luca Marchetti and Daniele Oriti. “Effective relational cosmological dynamics from Quantum Gravity”. In: *JHEP* 05 (2021), p. 025. DOI: [10.1007/JHEP05\(2021\)025](https://doi.org/10.1007/JHEP05(2021)025). arXiv: [2008.02774](https://arxiv.org/abs/2008.02774) [gr-qc].

Grants and awards

- 2022 **AARMS Postdoctoral Fellowship**, CAD 53,000.
- 2021 **Fondazione Angelo della Riccia Grant**, *Cosmological perturbation theory from Quantum Gravity*, PI, €17,700.

Public presentations

Conferences and Workshops

- Nov. 2023 UWO London (Canada), *Cosmology and Quantum Gravity Beyond Spacetime*, invited talk.
- Sep. 2023 IFT Madrid (Spain), *COSMO '23*.
- Sep. 2023 LMU Munich (Germany), *GFT Cosmology Workshop*, invited talk.
- July 2023 Radboud University Nijmegen (The Netherlands), *Quantum Gravity 2023*.
- June 2023 UNB Fredericton (Canada), *CAP Congress*.
- June 2023 MTA Sackville (Canada), *Theory Canada 15*.
- Mar. 2023 LMU Munich (Germany), *Foundations of Observational, Classical and Semi-Classical Gravitational Physics and The Problem of Agency and Laws of Nature*, invited talk.
- Dec. 2022 LMU Munich (Germany), *Quantum gravity, Hydrodynamics and Emergent Cosmology*, invited talk.
- July 2022 ENS Lyon (France), *LOOPS '22*.
- June 2021 PI Waterloo (Canada), *Quantizing time*.

Seminars

- Apr. 2023 FAU Erlangen-Nürnberg (Germany), *Quantum Gravity group seminar*, invited talk.
- Apr. 2023 Online, *ILQGS*, invited talk.
- Feb. 2023 UNB Fredericton (Canada), *Gravity group seminars*.
- Sep. 2022 OIST Okinawa (Japan), *QUAST group seminar*, invited talk.
- Sep. 2022 OIST Okinawa (Japan), *Quantum Geometry and Field Theory group seminar*, invited talk.
- June 2022 LMU Munich (Germany), *Quantum Gravity group seminar*.
- Nov. 2021 LMU Munich (Germany), *Quantum Gravity group seminar*.
- Nov. 2021 UNB Fredericton (Canada), *Gravity group seminar*, invited talk.
- Apr. 2021 LMU Munich (Germany), *Quantum Gravity group seminar*.
- Feb. 2021 LMU Munich (Germany), *Quantum Gravity group seminar*.
- Sep. 2020 University of Pisa (Italy), *Ph.D. seminars*.

July 2020 LMU Munich (Germany), *Fields and strings seminar*.
 June 2020 LMU Munich (Germany), *Quantum Gravity group seminar*.
 Sep. 2019 University of Pisa (Italy), *Ph.D. seminars*.
 Feb. 2018 INFN Pisa (Italy), *Virgo Pisa data analysis group meeting*.
 Nov. 2017 University of Pisa (Italy), *Comparative Quantum Gravity group seminar*.

Organizational and institutional roles

Organizational roles

Dec. 2022 Organizer of the workshop *Quantum gravity, Hydrodynamics and Emergent Cosmology* (LMU Munich).

Institutional roles

2023 - today Founder and member of the international *Cosmological Perturbations and Quantum Gravity* network. Senior members include: R. Brandenberger, S. Gielen, K. Giesel, L. Heisenberg, D. Oriti, M. Sakellariadou, T. Thiemann, J. Weller, E. Wilson-Ewing.
 2022 - 2023 Member of the COST action *CA18108 - Quantum gravity phenomenology in the multi-messenger approach (QG-MM)*.
 2021 - today Member of the *International Society for Quantum Gravity*; 🌐 isqg.org.
 2018 - 2020 Founder and member of *CQG group*; 🌐 comparativequantumgravity.wordpress.com.

Mentoring

2022 - 2023 Co-supervisor of Master's student David Garcia at LMU Munich.
 2021 - 2022 Co-supervisor of Master's student Patrick Fisher at LMU Munich.
 2021 - 2022 Co-supervisor of Master's student Tom Ladstätter at LMU Munich.

"Introduction to Physical Cosmology"

2018 - today Together with M. Monelli (MPA, Garching) and Prof. A. Ferrara (SNS, Pisa), I drafted a book on physical cosmology soon to be published by Edizioni della Normale; 🌐 front matter and book description available at http://cosmology.sns.it/physical_cosmology_book.html.

Technical skills

Latex: Mathematica: Python:

Public engagement

May 2019 Speaker at *Pint of Science* event in Pisa titled "Black Holes: a window on Quantum Gravity".