

Luca Ciambelli

Perimeter Institute for Theoretical Physics
31 Caroline Street North, Waterloo (ON)
Canada N2L 2Y5
ciambelli.luca@gmail.com

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Education

Ph.D (2016-2019), Advisor: [Marios Petropoulos](#)
[École Polytechnique](#), Palaiseau, France
Thesis: [AdS/CFT holographic correspondence, black holes and applications](#)

Master Degree in Theoretical Physics (2014-2016)
[École Normale Supérieure](#), Paris, France
Mention: très bien

Bachelor Degree in Physics (2011-2014)
[University of Trento](#), Italy
Score: 110 out of 110 with honour

Employment History

- Postdoctoral Scholar at the [Perimeter Institute for Theoretical Physics](#) (2022-present).
- Postdoctoral Scholar at the [Université Libre de Bruxelles](#) (2019-2022).

Research Interests

Quantum Gravity, AdS/CFT, Celestial Holography, Carrollian Physics, Asymptotic Symmetries.

Awards

2021 Marina Solvay Fellowship (Solvay Family, Belgium). Award given by Marc Henneaux (ULB & College de France).

International Collaborations

Member of the [Simons Collaboration on Celestial Holography](#)

Member of the collaboration "Topologically nontrivial configurations and nonperturbative effects", Fondecyt Regular Grant No 1240043, Chile

Teaching

- Lecturer (2h), University of Roma 3 (April '24). "Lezione Carrolliane"
- Virtual Lecture (2h), University of Roma 3 (April '23). "The Corner Proposal"

Click on the blue text for external links. Dates are in the European format dd/mm/yyyy.

- Lecturer (6h), [59. Winter School of Theoretical Physics and third COST Action CA18108 Training School "Gravity – Classical, Quantum and Phenomenology"](#) (12-21/02/23) "Cornering Quantum Gravity"
- Lecturer (6h), [XVIII Modave Summer School in Mathematical Physics](#) (05-09/09/2022). "Asymptotic Symmetries from a Geometric Viewpoint"
- Teaching Assistant (24h) (2021-2022) Université Libre de Bruxelles. Master course in advanced gravity. Chair: Glenn Barnich
- Teaching Assistant (24h) (2021-2022) Université Libre de Bruxelles. Master course in advanced quantum field theory. Chair: Glenn Barnich
- Teaching Assistant (24h) (2020-2021) Université Libre de Bruxelles. Master course in group theory and applications to physics. Chair: Geoffrey Compère
- Lecturer (4h), [Avogadro Meeting](#), Napoli (18-20/12/2019). "BMS & asymptotic symmetries in 4d flat space"
- Laboratory Teaching Assistant (128h) (2017-2018 and 2018-2019) École Polytechnique. Master course in experimental introduction to superconductivity. Chair: Yannis Laplace
- Teaching Assistant (40h) (2017-2018) École Polytechnique. Bachelor course in advanced quantum mechanics. Chair: Manuel Joffre

Invited Speaker at Conferences

- [Workshop on Spacetime and Quantum Information](#), Princeton, IAS (11-13/12/2023) "Symplectic Analysis of Null Raychaudhuri"
- [Kickoff Workshop, Simons Collaboration on Celestial Holography](#), Harvard (26-28/10/2023) "Null Raychaudhuri"
- [Carroll III](#), Thessaloniki (02-06/10/2023) "From Carrollian Conservation Laws to Poisson Bracket"
- Philosophy of Covariant Phase Space, London (17-19/08/2022). "Exploring Corners of the Covariant Phase Space"
- [Carroll](#), Vienna (15-22/02/2022). "Carroll Limit of Fluid/Gravity"
- [On the asymptotic structure of spacetime](#), Brussels (23-24/11/2020). "TMG with Compère-Song-Strominger boundary conditions"
- [Recent Developments in Strings and Gravity](#), Corfu, (10-17/09/2019). "Role of Weyl Connections in Holography"
- [SCGSC](#), Brussels (14-16/03/2018). "Covariant Carrollian hydrodynamics and flat holography"

Invited Speaker Seminars

- Yau Mathematical Sciences Center (June '24) "Carrollian geometry, dynamics, and gravity"
- Beijing Institute for Mathematical Sciences and Applications (June '24) "Gravity on Null Hypersurfaces: Geometry, Dynamics, Symplectica, Quantization"
- University of Pavia (April '24) "Symplectic Analysis of Null Hypersurfaces"
- Virtual, ENS Paris (March '24) "Quantum Aspects of Null Raychaudhuri"
- Virtual, ENS Lyon (Feb. '24) "Gravity on Null Hypersurfaces: Phase Space and Quantization"
- Virtual, [International LQG Seminar](#) (Jan. '24) "Symplectic Analysis of Null Raychaudhuri"
- Virtual, Drop Tower Bremen (Nov. '23) "From Asymptotic Symmetries to Gravitational Memory"

- Harvard Center for the Fundamental Laws of Nature (May '23). "Corners"
- University of Trento (April '23). "Corner Symmetries in Gravity"
- Università degli Studi di Milano Statale (April '23). "Corner Symmetries in Gravity"
- Centre de Physique Théorique de Marseille (March '23). "Corner Symmetries in Gravity"
- ENS Lyon (March '23). "Corner Symmetries in Gravity"
- ENS Paris (March '23). "Corner Symmetries in Gravity"
- Nordita Stockholm (May '22). "Building the Corner Proposal"
- École Polytechnique (March '22). "Universal Symmetries of Gravity"
- Virtual, Perimeter Institute (Dec. '21). "[New Perspectives on \(Quantum\) Gravity](#)"
- Università degli Studi di Milano (Dec. '21). "New Perspectives on (Quantum) Gravity"
- Virtual, Prague Charles University (Nov. '21). "New Perspectives on (Quantum) Gravity"
- Virtual, Tehran (Nov. '21). "Geometry of Corners"
- Virtual, Perimeter Institute (April '21). "[Lie Algebroids and BRST](#)"
- Virtual, Edinburgh (April '21). "Lie Algebroids and BRST"
- Santiago de Chile Andres Bello (Feb. '20). "The dual fluid of the Bondi gauge"
- Buenos Aires (Feb. '20). "The dual fluid of the Bondi gauge"
- ULB-VUB-Mons-KUL Series , Brussels (Oct. '19). "Weyl Symmetry in Holography"
- Tours (June '19). "Asymptotically flat fluid/gravity duality"
- Perimeter Institute (Feb. '19). "From hydrodynamics to gravity"
- Milano Bicocca (Oct. '18). "Carrollian fluids and flat holography"
- Torino University (Oct. '18). "Carrollian fluids and flat holography"
- CERN (June '18). "Carrollian fluids and flat holography"

Publications ([Inspire Page](#))

- [1] L. Ciambelli, J. Kowalski-Glikman, and L. Varrin, "Quantum Corner Symmetry: Representations and Gluing," [arXiv:2406.07101](#) [[hep-th](#)].
- [2] G. Barnich, L. Ciambelli, and H. A. González, "Chiral shift symmetries as an infinite tower of subleading super-shift symmetries," [arXiv:2405.17722](#) [[hep-th](#)].
- [3] L. Ciambelli, S. Pasterski, and E. Tabor, "Radiation in Holography," [arXiv:2404.02146](#) [[hep-th](#)].
- [4] L. Ciambelli, "Dynamics of Carrollian Scalar Fields," [arXiv:2311.04113](#) [[hep-th](#)].
- [5] L. Ciambelli and D. Grumiller, "Carroll geodesics," [arXiv:2311.04112](#) [[hep-th](#)].
- [6] L. Ciambelli and L. Lehner, "Fluid-gravity correspondence and causal first-order relativistic viscous hydrodynamics," *Phys. Rev. D* **108** (2023) no. 12, 126019.
- [7] L. Ciambelli, L. Freidel, and R. G. Leigh, "Null Raychaudhuri: canonical structure and the dressing time," *JHEP* **01** (2024) 166.
- [8] L. Ciambelli, A. Delfante, R. Ruzziconi, and C. Zwikel, "Symmetries and charges in Weyl-Fefferman-Graham gauge," *Phys. Rev. D* **108** (2023) no. 12, 126003.
- [9] L. Ciambelli, A. D'Alise, V. D'Esposito, D. Đorđević, D. Fernández-Silvestre, and L. Varrin, "Cornering quantum gravity," *PoS QG-MMSchools* (2023) 010.
- [10] L. Ciambelli, "From Asymptotic Symmetries to the Corner Proposal," *PoS Modave2022* (2023) 002.
- [11] A. Campoleoni, L. Ciambelli, A. Delfante, C. Marteau, P. M. Petropoulos, and R. Ruzziconi, "Holographic Lorentz and Carroll Frames," *JHEP* **12** (2022) 007.

- [12] L. Ciambelli and R. G. Leigh, “Universal Corner Symmetry and the Orbit Method for Gravity,” *Nucl. Phys. B* **986** (2023) 116053.
- [13] A. Aggarwal, L. Ciambelli, S. Detournay, and A. Somerhausen, “Boundary conditions for warped AdS₃ in quadratic ensemble,” *JHEP* **22** (2022) 013.
- [14] L. Ciambelli, R. G. Leigh, and P.-C. Pai, “Embeddings and Integrable Charges for Extended Corner Symmetry,” *Phys. Rev. Lett.* **128** (2022) .
- [15] L. Ciambelli and R. G. Leigh, “Isolated surfaces and symmetries of gravity,” *Phys. Rev. D* **104** (2021) no. 4, 046005.
- [16] L. Ciambelli and R. G. Leigh, “Lie algebroids and the geometry of off-shell BRST,” *Nucl. Phys. B* **972** (2021) 115553.
- [17] L. Ciambelli, C. Corral, J. Figueroa, G. Giribet, and R. Olea, “Topological Terms and the Misner String Entropy,” *Phys. Rev. D* **103** (2021) no. 2, 024052.
- [18] Q. Bonnefoy, L. Ciambelli, D. Lust, and S. Lust, “The swampland at large number of space-time dimensions,” *JHEP* **07** (2021) 009.
- [19] F. Alessio, G. Barnich, L. Ciambelli, P. Mao, and R. Ruzziconi, “Weyl charges in asymptotically locally AdS₃ spacetimes,” *Phys. Rev. D* **103** (2021) no. 4, 046003.
- [20] L. Ciambelli, S. Detournay, and A. Somerhausen, “New chiral gravity,” *Phys. Rev. D* **102** (2020) no. 10, 106017.
- [21] L. Ciambelli, C. Marteau, P. M. Petropoulos, and R. Ruzziconi, “Fefferman-Graham and Bondi Gauges in the Fluid/Gravity Correspondence,” *PoS CORFU2019* (2020) 154.
- [22] L. Ciambelli, C. Marteau, P. M. Petropoulos, and R. Ruzziconi, “Gauges in Three-Dimensional Gravity and Holographic Fluids,” *JHEP* **11** (2020) 092.
- [23] Q. Bonnefoy, L. Ciambelli, D. Lüst, and S. Lüst, “Infinite Black Hole Entropies at Infinite Distances and Tower of States,” *Nucl. Phys. B* **958** (2020) 115112.
- [24] L. Baulieu, L. Ciambelli, and S. Wu, “Weyl Symmetry in Stochastic Quantum Gravity,” *Class. Quant. Grav.* **37** (2020) no. 4, 045011.
- [25] L. Ciambelli and R. G. Leigh, “Weyl Connections and their Role in Holography,” *Phys. Rev. D* **101** (2020) no. 8, 086020.
- [26] L. Ciambelli, R. G. Leigh, C. Marteau, and P. M. Petropoulos, “Carroll Structures, Null Geometry and Conformal Isometries,” *Phys. Rev. D* **100** (2019) no. 4, 046010.
- [27] A. Campoleoni, L. Ciambelli, C. Marteau, P. M. Petropoulos, and K. Siampos, “Two-dimensional fluids and their holographic duals,” *Nucl. Phys. B* **946** (2019) 114692.
- [28] L. Ciambelli and C. Marteau, “Carrollian conservation laws and Ricci-flat gravity,” *Class. Quant. Grav.* **36** (2019) no. 8, 085004.
- [29] L. Ciambelli, C. Marteau, A. C. Petkou, P. M. Petropoulos, and K. Siampos, “Flat holography and Carrollian fluids,” *JHEP* **07** (2018) 165.
- [30] L. Ciambelli, C. Marteau, A. C. Petkou, P. M. Petropoulos, and K. Siampos, “Covariant Galilean versus Carrollian hydrodynamics from relativistic fluids,” *Class. Quant. Grav.* **35** (2018) no. 16, 165001.
- [31] L. Ciambelli, A. C. Petkou, P. M. Petropoulos, and K. Siampos, “The Robinson-Trautman spacetime and its holographic fluid,” *PoS CORFU2016* (2017) 076.

Mentorship

- [Antoine Somerhausen](#). Master Student Université Libre de Bruxelles
- [José de Jesús Padua Argüelles](#). Ph. D at the Perimeter Institute for Theoretical Physics (Internal Career Advisory)

- [Justin Kulp](#). Ph. D at the Perimeter Institute for Theoretical Physics (Internal Career Advisory)
- [Shuwei Liu](#). Ph. D at the Perimeter Institute for Theoretical Physics (Internal Career Advisory)
- Perimeter Scholars International [Eirini Telali](#), co-supervised with [Laurent Freidel](#), essay title “Entanglement of coherent excitations on horizons: Lessons for quantum gravity”
- Perimeter Scholars International [Robin Oberfrank](#), co-supervised with [Laurent Freidel](#), essay title “Quantization of corner symmetries in 3D gravity”
- Perimeter Scholars International [Elisa Tabor](#), co-supervised with [Sabrina Pasterski](#), essay title “A CarroCel of Stress Tensors: Unveiling Celestial Symmetries in the Flat Limit of AdS/CFT”
- Master Thesis Advisor and Erasmus Coordinator of Giovanni Martino Faraci, from Università degli Studi di Milano Statale to ENS Lyon (local advisor Marc Geiller)
- Master Thesis Advisor of Giovanni Boldi, Università degli Studi di Milano Statale, 2023/2024
- Master Thesis Advisor of Federico Capeccia, Università degli Studi di Milano Statale, 2023/2024

Reviewer

- [Physical Review L](#) (American Physical Society)
- [Physical Review D](#) (American Physical Society)
- [Nature Communications](#) (Springer)
- [Nuclear Physics B](#) (Elsevier)
- [The European Physical Journal C](#) (Springer)
- [Journal of High Energy Physics](#) (Springer)
- [SciPost](#)
- [Entropy](#) (MDPI)
- [Annales Henry Poincaré](#) (Springer)

Organised Conferences and Chairs

- Chair of the Quantum Gravity Seminar Series at Perimeter Institute for Theoretical Physics, 2023/2024. 40 Invited Speakers.
- Organiser (With Céline Zwikel) of the Conference [Quantum Gravity Around the Corner](#), Perimeter Institute for Theoretical Physics, (03-07/10/2022)
- ULB chair of the Joint Belgian Seminars, 2021/2022 and 2022/2023.
- Organiser (With Simone Speziale) of the Second Online Corners Meeting, (05-06/05/2022)
- Organiser (With Simone Speziale) of the First Online Corners Meeting, (23-24/11/2021)
- Sole Organiser of the [Gravity and Strings Conference](#), École Polytechnique, (26/09/2019)

Outreach

- [Interview](#) (in Italian) for the Italian Space Day (Giornata dello spazio) at the Italian Embassy in Belgium. Brussels (16/12/2021)
- Organiser of [Science & Cocktails](#), Brussels, (2019-2022)
- Welcoming party of international public and private delegations at Perimeter Institute for Theoretical Physics:
 - IBM Canada Leadership
 - Group of Toronto members of the [Young Presidents' Organization](#) (YPO).
 - Eva and Allen Lau, founders of [Two Small Fish Ventures](#)
 - French delegation, with Minister [Sylvie Retailleau](#)