

## Claudio Dappiaggi - March 2017

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Ricercatore Universitario Confermato (RTI)  
Dipartimento di Fisica  
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### Personal data

Name and surname: Claudio Dappiaggi  
Place and date of birth: Genève (Switzerland) - 05 August 1977  
Nationality: Italian  
Spoken Languages: Italian, English (Excellent), French (good), German (good), Spanish (basic).

### Education

Ph.D. in Physics (curriculum: mathematical physics), Università di Pavia, February 2004  
Supervisor: Prof. Mauro Carfora (mauro.carfora@pv.infn.it)  
Thesis: *Simplicial and asymptotical aspects of the holographic principle*

Degree in Physics, Università di Pavia, 24/03/2000 *Summa Cum Laude*  
Supervisor: Prof. Mauro Carfora  
Thesis: *Applicazioni del principio olografico in fisica gravitazionale* (transl. Applications of the holographic principle in gravitational physics)

### Research and Academic Positions

- **Adjunct Professor/Researcher - Permanent Staff Member in mathematical physics (MAT/07)** from 29/12/2010 at the Department of Physics of the University of Pavia (Italy)
- **Postdoc Fellow** from 01/04/2010 until 30/12/2010 at the II. Institut für Theoretische Physik - University of Hamburg
- **Junior Fellow** from 01/10/2009 (until 31/03/2010) at the Erwin Schrödinger Institute for Mathematical Physics - Wien
- **Humboldt Fellow** since 01/09/2007 (until 30/09/2009) at the II. Institut für Theoretische Physik - University of Hamburg
- **Research Contract** from 01/04/2007 to 31/05/2007: Dipartimento di Fisica - Università di Pavia
- **Research Contract** from 01/10/2006 to 31/12/2006: Dipartimento di Scienze e Tecnologia Avanzate - Università del Piemonte Orientale (project leader: Prof. Roberto Catenacci - e-mail:catenacc@unipmn.it)
- **Research Contract** from 01/08/2006 to 30/09/2006: Dipartimento di Fisica - Università di Pavia
- **Postdoc Grant** from 01/07/2004 to 31/07/2006: Dipartimento di Fisica - Università di Pavia
- **Visiting Ph.D.** from 01/01/2003 to 31/07/2003: Spinoza Institute - Utrecht University
- **Ph.D. Student** from 01/11/2000 to 15/02/2004: Dipartimento di Fisica - Università di Pavia

### Longer Term Visits

Host: Professor Valter Moretti

11-25 Feb. 2005  
Department of Mathematics - University of Trento

Host: Professor Martin Porrman 23-30 May 2009  
Centre for Quantum Technologies - University of Durban (South Africa)

Host: Professor Thorsten Ohl 28 June - 02 July 2010  
Institut für Theoretische Physik - Universität Würzburg

Host: Professor Felix Finster 17-22 Nov. 2014 and 11-22 May 2015  
Department of Mathematics - University of Regensburg

### Active Collaborations

I am collaborating on one or more projects with members of the following institutions:

- II. Institut für Theoretische Physik - Universität Hamburg
- Erwin Schrödinger Institute - Universität Wien
- Dipartimento di Matematica - Università di Trento
- Dipartimento di Matematica - Università di Genova
- Dipartimento di Matematica - Università di Milano
- Department of Mathematics - University of Nottingham
- Department of Mathematics - Universität Potsdam
- Department of Mathematics - Universität Regensburg
- Department of Mathematics - University of York (UK)

### Awards, Honors and Funding

- **National qualification (Habilitation) for associate and for full professor in mathematical physics (01/A4).**
- Erasmus Plus Fellowship at the University of Regensburg in 2015.
- Member of the PRIN “Geometric and analytic theory of Hamiltonian systems in finite and infinite dimensions” (2013-2016) - national coordinator: Boris Dubrovin
- Member of the project “*Influenza della materia quantistica sulle fluttuazioni gravitazionali*” funded by the GNFM-Indam (National Group for Mathematical Physics) in 2013.
- Research responsible for the project “*Topological effects and construction of quantum field theories*” funded by the GNFM-Indam (National Group for Mathematical Physics) in 2012.
- Responsible for the project “Modern Trends in AQFT” financed by the DAAD (Deutscher Akademischer Austauschdienst) and by the “Ateneo Italo-Tedesco”,
- Member of the project “*Stati quantistici di Hadamard e radiazione di Hawking da buchi neri rotanti*” funded by the GNFM-Indam (National Group for Mathematical Physics) in 2010.
- *ESI Fellow* for the winter semester Oct.2009-Mar.2010,
- *Humboldt Fellow* from the 01st of October 2007 until the 30th of September 2009,
- *Sigrav Prize 2006* as “outstanding young researcher” awarded from the *Italian Society of Gravitational Physics*,
- Research responsible for the project “*Olografia e spazitempo asintoticamente piatti: un approccio rigoroso*” funded by the GNFM-Indam (National Group for Mathematical Physics) in 2007.

## Books

1. Author with Valter Moretti and Nicola Pinamonti of *Hadamard States and the Bulk-to-Boundary Correspondence* – Springer-Verlag (to appear in 2017)
2. Author and Editor together with Romeo Brunetti, Klaus Fredenhagen and Jakob Yngvason of *Advances in Algebraic Quantum Field Theory* – Springer-Verlag (2015)

## Publication List – Peer reviewed

1. C. Dappiaggi and H. R. C. Ferreira, “On the algebraic quantization of a massive scalar field in anti-de-Sitter spacetime,” arXiv:1701.07215 [math-ph], submitted
2. C. Dappiaggi, S. Murro and A. Schenkel, “Non-existence of natural states for Abelian Chern-Simons theory,” arXiv:1612.04080 [math-ph], *J. Geom. Phys.* **116** (2017) 119
3. M. Benini, M. Capoferri and C. Dappiaggi, “Hadamard states for quantum Abelian duality,” arXiv:1611.10282 [math-ph], submitted
4. C. Dappiaggi and H. R. C. Ferreira, “Hadamard states for a scalar field in anti-de Sitter spacetime with arbitrary boundary conditions,” arXiv:1610.01049 [gr-qc], *Phys. Rev. D* **94** (2016) no.12, 125016
5. C. Dappiaggi, H. Gimperlein, S. Murro and A. Schenkel, “Wavefront sets and polarizations on supermanifolds,” arXiv:1512.07823 [math-ph], *J. Math. Phys.* **58** (2017) no.2, 023504
6. C. Dappiaggi, N. Drago, “A new deformation argument for Hadamard states via an extended Møller operator,” arXiv:1506.09122 [math-ph], *Lett. Math. Phys.* **106** (2016) no.11, 1587
7. M. Benini and C. Dappiaggi, “Models of free quantum field theories on curved backgrounds” in *Advances in Algebraic Quantum Field Theory*, Springer-Verlag (2015), arXiv:1505.04298
8. C. Dappiaggi “Hadamard States from null Infinity” – invited contribution to *Mathematical Quantum Physics*, published by Birkhäuser Basel, arXiv:1501.04808 [math-ph].
9. C. Dappiaggi, G. Nosari and N. Pinamonti, “The Casimir effect from the point of view of algebraic quantum field theory”, *Math. Phys. Anal. Geom.* **19** (2016), 1, arXiv:1412.1409 [math-ph].
10. C. Dappiaggi and A. Melati, “Curvature fluctuations on asymptotically de Sitter spacetimes via the semiclassical Einstein’s equations,” arXiv:1406.2223 [gr-qc], *Class. Quant. Grav.* **31** (2014) 235006.
11. M. Benini, C. Dappiaggi and S. Murro, “Radiative observables for linearized gravity on asymptotically flat spacetimes and their boundary induced states,” arXiv:1404.4551 [gr-qc], *J. Math. Phys.* **55** (2014) 082301.
12. M. Benini, C. Dappiaggi, T. -P. Hack and A. Schenkel, “A  $C^*$ -algebra for quantized principal  $U(1)$ -connections on globally hyperbolic Lorentzian manifolds,” arXiv:1307.3052 [math-ph], *Comm. Math. Phys.* **332** (2014) 477.
13. M. Benini, C. Dappiaggi and T. -P. Hack, “Quantum Field Theory on Curved Backgrounds – A Primer,” *Int. Jour. Mod. Phys. A* **28** (2013) 1330023, arXiv:1306.0527 [gr-qc], invited review.
14. M. Benini, C. Dappiaggi and A. Schenkel, “Quantized Abelian principal connections on Lorentzian manifolds,” arXiv:1303.2515 [math-ph], *Comm. Math. Phys* **330** (2014) 123.
15. K. Sanders, C. Dappiaggi and T. -P. Hack, “Electromagnetism, local covariance, the Aharonov-Bohm effect and Gauss’ law,” arXiv:1211.6420 [math-ph], *Comm. Math. Phys* **328** (2014) 625.
16. M. Benini, C. Dappiaggi and A. Schenkel, “Quantum field theory on affine bundles,” arXiv:1210.3457 [math-ph], *Ann. Henri Poinc.* **15** (2014) 171.
17. C. Dappiaggi, D. Siemssen, “Hadamard States for the Vector Potential on Asymptotically Flat Spacetimes,” *Rev. Math. Phys.* **25** (2013) 1350002, arXiv:1106.5575 [gr-qc].
18. C. Dappiaggi, B. Lang, “Quantization of Maxwell’s equations on curved backgrounds and general local covariance,” *Lett. Math. Phys.* **101** (2012) 265, arXiv:1104.1374 [gr-qc].
19. C. Dappiaggi “Remarks on the Reeh-Schlieder property for higher spin free fields on curved spacetimes,” *Rev. Math. Phys.* **23** (2011) 1035, arXiv:1102.5270 [math-ph].

20. C. Dappiaggi, T. -P. Hack, N. Pinamonti, “*Approximate KMS states for scalar and spinor fields in Friedmann-Robertson-Walker spacetimes,*” *Ann. Henri Poinc.* **12** (2011) 1449, arXiv:1009.5179 [gr-qc].
21. C. Dappiaggi, T. P. Hack, J. Moller and N. Pinamonti, “*Dark Energy from Quantum Matter,*” arXiv:1007.5009 [astro-ph.CO].
22. C. Dappiaggi, G. Lechner and E. Morfa-Morales, “*Deformations of quantum field theories on spacetimes with Killing vector fields,*” *Comm. Math. Phys.* **305** (2011) 99, arXiv:1006.3548 [math-ph]
23. C. Dappiaggi, N. Pinamonti and M. Porrmann, “*Local causal structures, Hadamard states and the principle of local covariance in quantum field theory,*” *Comm. Math. Phys.* **304** (2011) 459, arXiv:1001.0858 [hep-th]
24. C. Dappiaggi, V. Moretti and N. Pinamonti, “*Rigorous construction and Hadamard property of the Unruh state in Schwarzschild spacetime,*” arXiv:0907.1034 [gr-qc], *Adv. Theo. Math. Phys.* **15** (2011) 355
25. C. Dappiaggi, T. Hack and N. Pinamonti, “*Remarks on the conformal anomaly for Dirac fields,*”, *Rev. Math. Phys.* **21** (2009) 1241, arXiv:0904.0612 [math-ph].
26. C. Dappiaggi, V. Moretti and N. Pinamonti, “*Distinguished quantum states in a class of cosmological spacetimes and their Hadamard property,*” *J. Math. Phys.* **50**, 062304 (2009), arXiv:0812.4033 [gr-qc].
27. C. Dappiaggi, V. Moretti and N. Pinamonti, “*Cosmological horizons and reconstruction of quantum field theories,*” *Comm. Math. Phys.* **285** (2009) 1129, arXiv:0712.1770 [gr-qc].
28. C. Dappiaggi, K. Fredenhagen and N. Pinamonti, “*Stable cosmological models driven by a free quantum scalar field,*” *Phys. Rev. D* **77** (2008) 104015, arXiv:0801.2850 [gr-qc].
29. C. Dappiaggi, “*On the Lagrangian and Hamiltonian formulation of a scalar free field theory at null infinity,*” *Rev. Math. Phys.* **20** (2008) 801, arXiv:math-ph/0607055.
30. C. Dappiaggi, “*Projecting massive scalar fields to null infinity,*” *Ann. Henri. Poinc.* **9** (2008) 35, arXiv:0705.0284 [gr-qc].
31. M. Carfora, C. Dappiaggi and V. L. Gili, “*Boundary Conformal Field Theory and Ribbon Graphs: a tool for open/closed string dualities,*” *JHEP* **07** (2007) 21 arXiv:0705.2331 [hep-th].
32. M. Carfora, C. Dappiaggi and V. L. Gili, “*Triangulated surfaces in twistor space: A kinematical set up for open / closed string duality,*” *JHEP* **12**(2006) 17 [arXiv:hep-th/0607146].
33. C. Dappiaggi, V. Moretti and N. Pinamonti, “*Rigorous steps towards holography in asymptotically flat spacetimes,*” *Rev. Math. Phys.* **18** (2006) 349 [arXiv:gr-qc/0506069].
34. B. Bertotti, R. Catenacci and C. Dappiaggi, “*The legacy of pseudospheres: from geometry to physics*” *Riv. Nuovo Cimento* **29** (2006) 1.
35. C. Dappiaggi and S. Raschi, “*Spectroscopy of an AdS Reissner-Nordstroem black hole,*” *Int. J. Mod. Phys. D* **15** (2006) 439 [arXiv:gr-qc/0507015].
36. B. Bertotti, R. Catenacci and C. Dappiaggi, “*Pseudospheres in geometry and physics: From Beltrami to de Sitter and beyond,*” *Rend. Ist. Lombardo A Sci.Mat.Fis.Chim.Geol.* **39** (2007) 165 arXiv:math.ho/0506395.
37. C. Dappiaggi, “*Elementary particles, holography and the BMS group,*” *Phys. Lett. B* **615** (2005) 291 [arXiv:hep-th/0412142].
38. C. Dappiaggi, “*BMS field theory and holography in asymptotically flat space-times,*” *JHEP* **0411** (2004) 011 [arXiv:hep-th/0410026].
39. G. Arcioni and C. Dappiaggi, “*Holography in asymptotically flat space-times and the BMS group,*” *Class. Quant. Grav.* **21** (2004) 5655 [arXiv:hep-th/0312186].

40. M. Carfora, C. Dappiaggi and A. Marzuoli, “*The conformal geometry of random Regge triangulations,*” published in ‘Advances in General Relativity and Cosmology’, Giorgio Ferrarese (Ed.) arXiv:gr-qc/0310039.
41. G. Arcioni and C. Dappiaggi, “*Exploring the holographic principle in asymptotically flat spacetimes via the BMS group,*” Nucl. Phys. B **674** (2003) 553 [arXiv:hep-th/0306142].
42. G. Arcioni, M. Carfora, C. Dappiaggi and A. Marzuoli, “*The WZW model on random Regge triangulations,*” J. Geom. Phys. **52** (2004) 137 [arXiv:hep-th/0209031].
43. M. Carfora, C. Dappiaggi and A. Marzuoli, “*The modular geometry of random Regge triangulations,*” Class. Quant. Grav. **19** (2002) 5195 [arXiv:gr-qc/0206077].

### Conference proceedings

1. C. Dappiaggi “*An overview on algebraic quantum field theory*” Proceedings of the Humboldt Kolleg, held in Corfu (September 2015), PoS CORFU **2015** (2016) 098.
2. V. L. Gili, M. Carfora and C. Dappiaggi, “*BCFT and Ribbon Graphs as tools for open/closed string dualities,*” arXiv:0710.5899 [hep-th] in the Proceedings of the 7th International Workshop Lie Theory and Its Applications in Physics held in Varna (Bulgaria) 18-24 (June 2007) - Bulg. J. Phys. **35** (2008) 107.
3. C. Dappiaggi “*Holography in asymptotically flat spacetimes: recent results and perspectives*” Proceedings of the XVII Sigrav Meeting held in Turin 4-7 September 2006 available at <http://www.sigrav.org/Private/Procs.it.php>.
4. C. Dappiaggi, “*Can we implement the holographic principle in asymptotically flat spacetimes?,*” Proceeding of the IV International Symposium on “*Quantum Theory and Symmetries*” Heron Press (2006) ed. V.K. Dobrev arXiv:hep-th/0511020.
5. C. Dappiaggi, “*BMS field theory and the open roads,*” J. Phys. Conf. Ser. **33** (2006) 254.
6. M. Carfora, C. Dappiaggi and V. Gili, “*Simplicial aspects of string dualities,*” AIP Conf. Proc. **751** (2005) 182 [arXiv:hep-th/0410006].
7. G. Arcioni and C. Dappiaggi, “*Holography and BMS field theory,*” AIP Conf. Proc. **751** (2005) 176 [arXiv:hep-th/0409313].

### Other E-prints

1. C. Dappiaggi, “*Simplicial and asymptotical aspects of the holographic principle,*” arXiv:gr-qc/0403072. (Ph.D. thesis)

### Invited Talks

- 13/04/2017 - Department of Mathematics - Workshop *QFT Day in Milan: mathematical aspects of renormalization*, University of Milan – “*On the construction of the Green operators and of the ground state for a massive scalar field theory in AdS*”
- 02/12/2016 - Department of Mathematics - University of Trento – “*On the construction of the Green operators and of the ground state for a massive scalar field theory in AdS*”
- 02/12/2016 - Department of Mathematics - University of Trento – “*On the construction of the Green operators and of the ground state for a massive scalar field theory in AdS*”
- 03/11/2016 - Department of Mathematics - University of Potsdam – “*On the construction of the Green operators and of the ground state for a massive scalar field theory in AdS*”
- 25/09/2015 - Algebraic Quantum Field Theory on Lorentzian Manifolds - Minisymposium at the Deutsche Mathematiker-Vereinigung (Hamburg) - “*A novel deformation argument for Hadamard state via an extended Møller operator*”
- 20/09/2015 - Workshop “Open problems in theoretical physics: the issue of quantum space-time” (Corfu - Greece) - “*An overview on algebraic quantum field theory on curved spacetimes*”

- 09/09/2015 - Programme “Modern Theory of Wave equations” (ESI - Vienna) - “*A novel deformation argument for Hadamard state via an extended Møller operator*”
- 20/07/2015 - Conference “Operator Algebras and Quantum Physics” (Sao Paolo (Brazil) - ICMP Satellite Meeting) - “*A novel deformation argument for Hadamard state via an extended Møller operator*”
- 14/07/2015 - Marcel Grossman meeting (Rome - La Sapienza) - “*A novel deformation argument for Hadamard state via an extended Møller operator*”
- 31/03/2015 - Workshop “Problemi attuali di fisica teorica” (Vietri sul Mare) - “*Remarks on the Casimir effect from the point of view of algebraic quantum field theory*”
- 11/02/2015 - Conference “New trends in Algebraic Quantum Field Theory” - “*Curvature Fluctuations in Asymptotically de Sitter Spacetimes*”
- 21/11/2014 - Oberseminar Analysis at the Department of Mathematics - University of Regensburg
- 20/11/2014 - Colloquium at the Department of Mathematics - University of Regensburg
- 30/10/2014 - Department of Mathematics - University of Milan - “*The Casimir effect from the point of view of algebraic quantum field theory*”
- 29/09/2014 - Conference “Quantum Mathematical Physics” (Regensburg) - “*On the construction of Hadamard states from null infinity*”
- 15/09/2014 - Meeting “Operator and Geometric Analysis on Quantum Theory” (Trento) - “*Remarks on the Casimir effect from the point of view of algebraic quantum field theory*”
- 03/07/2014 - Conference “Asymptotic Analysis in General Relativity” (Grenoble) - “*On the role of asymptotic structures in the construction of quantum states*”
- 25/10/2013 PRIN meeting - Università di Roma 3 - “*On the phase space of Maxwell’s equations*”
- 22/07/2013 Conference “New Crossroads between Mathematics and Quantum Field Theory” - MFO (Oberwolfach) - “*Hadamard states from null boundaries*”
- 22-26/04/2013 Conference “Variational and spectral methods in Quantum Field Theory” - IHP (Paris) - “*The principle of general local covariance and the quantization of electromagnetism*”
- 06/02/2013 Workshop “Nonlinear waves and integrable systems 2013” - Sissa (Trieste) - “*Hyperbolic PDEs and algebraic quantum field theory*”
- 16/11/2012 Workshop “Perspectives of Fundamental Cosmology” - Nordita (Stockholm) - “*Quantum field theory on curved backgrounds and Hadamard states*”
- 16/11/2012 Workshop “Perspectives of Fundamental Cosmology” - Nordita (Stockholm) - “*Stable cosmological models and the semiclassical Einstein’s equations*”
- 26-28/09/2012 Workshop “Algebraic Quantum Field Theory and local symmetries” - Hausdorff Research Center for Mathematics (Bonn) - “*New insights the quantization of Maxwell’s equations on curved backgrounds*”
- 12/09/2012 Workshop “New Trends in Algebraic Quantum Field Theory” - Center for Mathematical Physics (Frascati - Rome) - “*New insights the quantization of Maxwell’s equations on curved backgrounds*”
- 13/04/2012 Convegno di Fisica Matematica in onore di Roberto Catenacci - University of Piemonte Orientale (Alessandria): “*The Bertotti-Robinson Universe and the quantization of Maxwell’s equations on curved backgrounds*”
- 26/09/2011 Workshop “Rigorous Quantum Field Theory in the LHC Era” - Erwin Schrödinger Institute (Vienna): “*On the quantization of Maxwell’s equations on curved backgrounds*”
- 05/07/2011 University of Hamburg: “*The surprises of the quantization of Maxwell’s equations on curved backgrounds*”
- 26/05/2011 University of Genova: “*On higher spin fields and their quantization on curved backgrounds*”

- 24/05/2011 Workshop "Noncommutativity and Physics: Spacetime Quantum Geometry" - Bayrischzell (Germany) "*Deformation of quantum field theories and curved backgrounds*"
- 21/02/2011 University of Utrecht: "*On the Contribution of Free Fields to  $\Lambda$ CDM*"
- 24/08/2010 Workshop "Quantum Field Theory on Curved Spacetime - From the Algebraic Approach to Local Covariance" (Durban): "*Local causal structures, local Hadamard states and local covariance*"
- 28/06-02/07/2010 University of Würzburg: course on "*Introduction to quantum field theory on curved backgrounds*"
- 12/05/2010 University of Hamburg: "*From local causal structures to Hadamard states*"
- 29/03/2010 Workshop "Problemi attuali di fisica teorica" - (Vietri sul Mare): "*Beyond the event horizon: the Hadamard property of the Unruh state*"
- 25/03/2010 Workshop "Quantum Field Theory on curved spacetimes" - (ESI, Vienna): "*Beyond the event horizon: the Hadamard property of the Unruh state*"
- 29-30/01/2010 University of Leipzig: speaker in the Mitteldeutsche Physik Combo, giving a course entitled: "*Introduction to Quantum Field Theory on curved Backgrounds with the algebraic formalism - part II*"
- 26/01/2010 University of Vienna: "*Examples and explicit construction of Hadamard states*", final lecture of the course "Quantum field theory over curved backgrounds"
- 13/01/2010 University of Hamburg: "*Peeking through the horizon: the Hadamard property of the Unruh state*"
- 08-09/01/2010 University of Jena: speaker in the Mitteldeutsche Physik Combo, giving a course entitled: "*Introduction to Quantum Field Theory on curved Backgrounds with the algebraic formalism - part I*"
- 03/12/2009 University of Vienna: "*An application of semiclassical Einstein's equations in cosmology*"
- 24-25/06/2009 University of Leipzig: mini-course "*On the role of asymptotic structures in quantum field theory over curved backgrounds*"
- 29/05/2009 University of Durban: "*Distinguished quantum ground state in Friedmann-Robertson-Walker spacetimes*"
- 27/05/2009 University of Durban: "*From semiclassical Einstein's equations to cosmology*"
- 23/04/2009 SFB Colloquium (Hamburg): "*Algebraic quantum field theory meets cosmology*"
- 03/03/2009 SFB Meeting (Bergedorf): "*Algebraic quantum field theory meets cosmology*"
- 23/02/2009 University of Pavia: "*Quantum field theory over curved backgrounds and cosmology*"
- 14/01/2009 University of Hamburg: "*Distinguished ground states in cosmological spacetimes*"
- 27/05/2008 Department of Mathematics - York University: "*Mathematical aspects of the holographic principle*"
- 11/01/2008: Courant Center - Universität Göttingen: "*Formal Aspects of the Holographic Principle in Asymptotically Flat Spacetimes*"
- 24/10/2007 University of Hamburg: "*The road to holography in asymptotically flat spacetimes*"
- 10/05/2007 Department of Mathematics - Heriot Watt University (Edinburgh): "*The holographic principle and asymptotically flat spacetimes*"
- 28/11/2006 Department of Advanced Sciences and Technologies - Università del Piemonte Orientale (Alessandria) "*Holography and asymptotically flat spacetimes: results and perspectives*".
- 04/09/2006 Sigrav Meeting (Turin) - "*Exploring holography in asymptotically flat spacetimes via the BMS group*"

- 11/05/2006 Department of Physics - Università di Como “*The holographic principle in asymptotically flat spacetimes: new results and perspectives,*”
- 6/04/2006 Assemblée Nazionale GNFM: “*Quantum field theory and holography on the null boundary of an asymptotically flat spacetime*”
- 14/08/2005 QTS-4 Conference held in Varna: “*The neverending quest of holography in asymptotically flat space-times*”
- 28/01/2005 Department of Physics - Università di Trento “*The Quest for holography in asymptotically flat spacetimes*”

### Contributed Talks

- 09 July 2013: 20th International Conference on General Relativity and Gravitation - Warsaw: “*On the algebraic quantization of Abelian gauge theories on curved spacetimes*”
- 01 June 2013: 32nd Workshop on Foundation and Constructive Aspects of QFT - Wuppertal: “*The principle of general local covariance and the quantization of Abelian gauge theories*”
- 08 August 2012: XVII International Congress in Mathematical Physics (Aahrus) “*New insights the quantization of Maxwell’s equations on curved backgrounds*”
- 05 August 2009: XVI International Congress in Mathematical Physics (Prague) “*Studying the back-reaction of quantum scalar fields in a cosmological scenario*”
- 12 March 2009: DPG Tagung - München “*A novel point of view on the conformal anomaly of quantised Dirac fields*”
- 27 June 2008: 40th Symposium on Mathematical Physics - Torun: “*Cosmological Horizons and Reconstruction of Quantum Field Theories*”
- 07 June 2008: 22nd Workshop on Foundation and Constructive Aspects of QFT - Hamburg: “*Cosmological Horizons and Reconstruction of Quantum Field Theories*”
- 30 June 2007: 20th Workshop on Foundation and Constructive Aspects of QFT - Leipzig: “*Projecting massive scalar fields on null infinity: a step towards an holographic description*”
- 10 Dec. 2005: 17th Workshop on Foundation and Constructive Aspects of QFT - Göttingen: “*Aspects of Holography in Asymptotically Flat Spacetimes and the BMS Group*”
- Sep.2005 Constr. Dyn. and Quant. Grav. Conference - Cala Gonone: “*The neverending quest of holography in asymptotically flat space-times*”
- 21 March 2005 Problemi Attuali di Fisica Teorica - Vietri sul Mare: “*The neverending quest of holography in asymptotically flat space-times*”
- Sep. 2004 XVI SIGRAV - Vietri Sul Mare: “*Aspects of Holography in Asymptotically Flat Spacetime and the BMS Group*”
- July 2004 GR17 - (Dublin): “*Holography in asymptotically flat space-times and the BMS group*”
- April 2004 Problemi Attuali di Fisica Teorica - Vietri Sul Mare: “*Holography in asymptotically flat space-times and the BMS group*”
- March 2004 319th Heraeus Seminar - Mathematical Relativity held in Bad-Honnef: “*Exploring the holographic principle in flat space-times via the BMS group*”
- Feb. 2003 Spinoza Institute - Utrecht: “*Modular properties of Random Regge Triangulations*”

### Editorial board

- Editor for *Advances in Mathematical Physics* – Hindawi
- Editor for *Geometric Flows* – De Gruyter
- Review editor for *Frontiers in mathematical physics* - till 2016



### **Referee for international research projects**

- Referee for the PCE projects - Romanian Executive Agency for Higher Education, Research, Development and Innovation Funding
- Referee for the SIR projects - MIUR (Italian ministry for research and university)
- Referee for the DFG (German Research Foundation)

### **Referee and Reviewer - peer reviewed journals**

- JHEP
- International Journal of Geometric Methods in Modern Physics
- Proceedings of the Royal Society - Series A
- Journal of Differential Geometry
- Letters in mathematical physics
- Communications in mathematical physics
- Canadian Journal of Physics
- Frontiers in mathematical physics
- European Physical Journal C
- The Hadronic Journal
- Foundations of Physics
- Reviews in Mathematical Physics
- SIGMA
- Journal of Mathematical Physics
- Journal of Physics A
- Annales Henri Poincaré
- Physical Review Letters
- Classical and Quantum Gravity
- General Relativity and Gravitation
- Reviewer for Mathematical Reviews - American Mathematical Society – till 2015

### **Ph.D. Students**

- Francesco Bussola - 10/2015-10/2018 - Project tba
- Simone Murro - 05/2014 - 04/2017 - “*Quantum States on the algebra of observables for Dirac fields*” – Co-supervisor at the University of Regensburg (supervisor: Prof. Felix Finster)
- Samuel Rutili - 10/2013-04/2017 - Project on “*Thermal states on curved backgrounds for interacting quantum field theories*”
- Gabriele Nosari - 10/2013 - 02/2017 - Project on “*On the algebraic approach to the dynamical Casimir effect*”
- Marco Benini - 10/2011 - 01/2015 - “*Locality in Abelian gauge theories over globally hyperbolic spacetimes*” (excellent)

## Laurea Thesis Supervisor and Co-supervisor

- December 2017 - MSc - Luca Apadula (University of Pavia & Sissa)
- July 2017 (tentative date) - BSc - Rubens Longhi (University of Pavia) - in preparation.
- July 2017 (tentative date) - BSc - Alice Marveggio (University of Pavia) - in preparation.
- April 2017 - IUSS - Matteo Capoferri (University College London) - “A microlocal-analytic approach to the propagator of the wave operator” - in preparation
- December 2016 - MSc - Gioele Botta (University of Pavia & Sissa) - “New cosmological singularity resolution from quantum gravity: the Emergent-Bouncing universe” (full marks and honours).
- October 2016 - BSc - Angelo Naldi (University of Pavia) - “Introduzione alle equazioni di Eulero con applicazioni ai flussi potenziali” (104/110).
- September 2016 - BSc - Denny Trimcev (University of Pavia) - “Solitonic Solutions of NLS equation applied to Bose-Einstein Condensates” (110/110).
- September 2016 - IUSS - Paolo Rinaldi (University of Pavia) - “C\*- and von Neumann Algebras: Structural Aspects of the Observables of a Quantum System” (excellent)
- July 2016 - MSc - Giovanni Canepa (University of Pavia) - “An Ideal Characterization of Friedmann-Lemaitre-Robertson-Walker Spacetimes” (full marks and honours)
- July 2016 - MSc - Matteo Capoferri (University of Pavia) - “Algebra Of Observables And States For Quantum Abelian Duality” (full marks and honours) – **awarded with the Grazioli Price 2016 at the Istituto Lombardo**
- July 2016 - BSc - Paolo Rinaldi (University of Pavia) - “Criteri per l’Identificazione di Osservabili in Meccanica Quantistica” (full marks and honours)
- November 2015 - MSc - Antonio Michele Miti (University of Milan) - “Algebraic Quantization of Jacobi Fields and Geometric Approach to Peierls Brackets” (110/110).
- October 2015 - BSc - Marcello Lanfranchi (University of Pavia) - “Formalizzazione algebrica del processo di quantizzazione e deformazione di C\*-algebra” (103/110).
- July 2015 - BSc - Gabriele Benomio (University of Pavia) - “Thermal equilibrium states in the algebraic formulation of quantum mechanics” (full marks and honours).
- December 2014 - MSc - Federico Faldino (University of Pavia) - “On the loop quantization of field theories” (full marks).
- October 2014 - IUSS - Giovanni Canepa (University of Pavia) - “Riesz potentials and construction of Green functions for wave-like equations” (excellent)
- October 2014 - IUSS - Matteo Capoferri (University of Pavia) - “The handling of singularities: an introduction to microlocal analysis” (excellent)
- October 2014 - IUSS - Sara Ricc  (University of Pavia & of Geneva) - “B-modes and the CMB” (excellent)
- July 2014 - BSc - Matteo Capoferri (University of Pavia) - “On the time observable in non-relativistic quantum mechanics” (full marks and honours)
- July 2014 - BSc - Giancarlo Croce (University of Pavia) - “Operatori di Casimir” (full marks and honours).
- April 2014 - MSc - Alberto Melati (University of Pavia) - “Curvature fluctuations in asymptotically de Sitter spacetimes” (110/110).
- April 2014 - MSc - Sara Ricc  (University of Pavia) - “States of low energy for the Dirac field on cosmological spacetimes” (full marks and honours).
- December 2013 - BSc - Matteo Facchini (University of Pavia) - “Gruppi di simmetria e regola di superselezione di Bargmann” (full marks and honours).

- October 2013 - MSc - Gabriele Nosari (University of Pavia) - “Point-splitting Hadamard regularization and the Casimir effect” (110/110)
- October 2013 - MSc - Simone Murro (University of Pavia) - “Hadamard states for linearized gravity in asymptotically flat spacetimes” (110/110).
- May 2013 - IUSS - Matteo Lostaglio (University of Pavia & Imperial College) - “Geometry and Physics: Gauge and Lorentz invariance” (outstanding)
- May 2013 - IUSS - Alessio Belenchia (University of Pavia & SISSA) - “Inflazione cosmologica: teoria ed osservazioni” (outstanding)
- February 2012 - BSc - Luca Mantovani (University of Pavia) “On the algebraic formulation of quantum mechanics” (104/110)
- December 2011 - BSc - Daniele Castellana (University of Pavia) “Relativity and Thermodynamics” (full marks)
- November 2011 - BSc - Davide Polini (University of Pavia) “On the dynamics of free field from the representations of the Poincaré group” (full marks and honours)
- October 2011 - MSc - Marco Benini (University of Pavia) “On the relative Cauchy evolution for spin 1 fields” (full marks and honours)
- May 2011 Daniel Siemssen (Universität Hamburg): “Hadamard states for the vector potential in asymptotically flat spacetimes” [http://www.desy.de/uni-th/theses/Dipl\\_Siemssen.pdf](http://www.desy.de/uni-th/theses/Dipl_Siemssen.pdf), co-supervisor
- July 2005 Simona Raschi: “Black holes spectroscopy” (full marks and honours), co-supervisor
- March 2004 Davide Cassani: “Topological field theories and the quantum Hall effect” (full marks and honours), co-supervisor
- March 2003 Giuditta Parolini: “Lie algebra and conformal field theories” (full marks and honours), co-supervisor

### Committees

- 24/04/2017 Referee and member of the evaluation committee for the final dissertation of Simone Murro (Univ. of Regensburg - Ph.D. in mathematics)
- 24/02/2016 Referee and member of the evaluation committee for the final dissertation of Antoine Géré (Univ. of Genova - Ph.D. in mathematics)
- 22/02/2016 Member of the evaluation committee for the final dissertation of Davide Fermi (Univ. of Milan - Ph.D. in mathematics)
- 13/11/2014 Member of the evaluation committee for the final dissertation of Davide Pastorello (Univ. of Trento - Ph.D. in mathematics)
- 2013-2016 Member of the Joint Committee of the Department of Physics - University of Pavia
- February 2013 Referee for the Ph.D. thesis of Zhirayr Avetisyan - Institute of Physics at the Univ. of Leipzig

### Teaching Experience

- Chair of “Group Theory and Physical Symmetries” (6 credits), academic year 2015/2016 (degree in physics and mathematics - Univ. Pavia)
- Chair of “Mathematical Introduction to Fluid Dynamics”, academic year 2016/2017 (IUSS Pavia - Class of Science)
- Chair of “Mathematical Methods in Physics II” (6 credits), academic year 2016/2017 (bachelor in physics - Univ. Pavia)
- Chair of “Mathematical methods of quantum theories”, graduate school in physics, academic year 2015/2016,

- Chair of “Group Theory and Physical Symmetries” (6 credits), academic year 2015/2016 (degree in physics and mathematics - Univ. Pavia)
- Assistant for “Classical Mechanics” (3 credits), academic year 2015/2016 (degree in physics - Univ. Pavia)
- Chair of “Group Theory and Physical Symmetries” (6 credits), academic year 2014/2015 (degree in physics and mathematics - Univ. Pavia)
- Assistant for “Classical Mechanics” (3 credits), academic year 2014/2015 (degree in physics - Univ. Pavia)
- Chair of “Spacetime Structure, Cosmology, and Quantum Field Theory”, academic year 2013/2014 (PhD programme in physics - Univ. Pavia)
- Chair of “Group Theory and Physical Symmetries”, academic year 2013/2014 (degree in physics and mathematics - Univ. Pavia)
- Assistant for “Classical Mechanics” (3 credits), academic year 2013/2014 (degree in physics - Univ. Pavia)
- Chair of “Group Theory and Physical Symmetries”, academic year 2012/2013 (degree in physics and mathematics - Univ. Pavia)
- Assistant for “Classical Mechanics”, academic year 2012/2013 (degree in physics - Univ. Pavia)
- Coordinator of the Ph.D. course “Spacetime structure, Cosmology, and Quantum Field Theory”, Ph.D. school in Physics, academic year 2012/2013,
- Chair of “Group Theory and Physical Symmetries”, academic year 2011/2012 (degree in physics and mathematics - Univ. Pavia)
- Assistant for “Classical Mechanics”, academic year 2011/2012 (degree in physics - Univ. Pavia)
- Assistant for “General Relativity”, academic year 2010/2011 (degree in physics and mathematics - Univ. Pavia)
- Assistant for “Quantum Mechanics 2”, academic year 2008/2009 (degree in physics and mathematics - Univ. Hamburg)
- Teaching assistant for “Differential Equations and Dynamical Systems”, academic year 2006/2007 (degree in physics and mathematics - Univ. Pavia)
- Teaching assistant for “Group Theory”, academic year 2006/2007 (degree in physics and mathematics - Univ. Piemonte Orientale)
- Seminars for “General Relativity”, academic year 2005/2006. (degree in physics and mathematics - Univ. Pavia)
- Teaching assistant for “Gruppi e Simmetrie Fisiche” (Group theory and Physical Symmetries), academic year 2005/2006. (degree in physics and mathematics - Univ. Pavia)
- Teaching assistant for “Meccanica Razionale” (Classical Mechanics), academic year 2004/2005. (degree in physics - Univ. Pavia),
- Teaching assistant for “Geometria” (Linear Algebra) academic year 2002/2003 (degree in physics and mathematics - Univ. Pavia),
- Tutor for the physics course - degree in “chemistry technician”. academic year 2000-2001,
- Tutor for Electromagnetism and Experimental Electromagnetism, academic year 1999-2000 and 2000-2001 (degree in physics - Univ. Pavia).

## Conference and Seminar Organization

- Member of the Organizing Committee of the topical Workshop “Foundational and structural aspects of gauge theories”, MITP - Mainz (27th of May – 02nd of June 2017),
- Member of the Organizing Committee of the topical Workshop “Microlocal Analysis: A Tool to Explore the Quantum World”, Department of Mathematics - Genoa (12-13 January 2017),
- Member of the Organizing Committee of the Workshop “Algebraic Quantum Field Theory: its status and its future”, Erwin Schrödinger Institute - Vienna (19th-23rd May 2014),
- Member of the Organizing Committee of the Mini-Workshop “New Crossroads between Mathematics and Field Theory”, Oberwolfach (21st-27th July 2013),
- Member of the Scientific Committee of the Conference “Mathematical Aspects of Quantum Field Theory and Quantum Statistical Mechanics”, Satellite Meeting of the ICMP2012, Hamburg (30th of July - 01st of August 2012),
- Member of the Scientific Committee of the Workshop “Planckland: Quantum Geometry and Matter”, Sissa-Trieste (13th-18th February 2012),
- Member of the Organizing Committee of the Workshop “Modern Trends in Algebraic Quantum Field Theory”, Pavia (14th-16th September 2011),
- Member of the Organizing Committee of the Workshop “Foundational Aspects of Cosmology”, Hamburg (16th-18th February 2011),
- Organizer of the Mathematical and Quantum Field Theory Seminars at the II. Institut für Theoretische Physik (Hamburg Universität) - 2008/2009,
- Member of the Organizing Committee of the 22nd LQP Workshop, Hamburg (06th-07th June 2008),
- Member of the Conference Secretariat for the Conference “Spacetime in action”, Pavia (29-03/02-04 2005).

## Outreach

F. Bussola and C. Dappiaggi, *Ligo e Le Onde Gravitazionali*, RADIAZIONI RICERCA E APPLICAZIONI, Periodico della Società Italiana per le Ricerche sulle Radiazioni, Vol XIX (2016).

Several talks for high school classes and at the  $\pi$ -day on General Relativity and Gravitational waves. I built and presented together with N. Protti (INFN - Pavia) a solar oven for the ERN 2016.

## Technical Skills

Computer Skills: Linux, L<sup>A</sup>T<sub>E</sub>X, Html.