Simone Murro

Dipartimento di Matematica
Università degli studi di Trento
38123 Povo (TN), Italy

simone.murro@unitn.it
http://simonemurro.eu

Scientific Interests

Physics	Classical and Quantum Field Theory on Curved Spacetimes, General Relativity
Math	Differential Geometry, Global Analysis, Mathematical Physics, Operator Algebras

Education

April 2017 April 2014	**University of Regensburg**, Germany, Magna cum laude *Ph.D. Degree in* Mathematics Thesis: "Quantum states on the algebras of Dirac fields: A functional analytic approach" Advisor: Prof. Dr. Felix Finster Coadvisor: Prof. Dr. Claudio Dappiaggi
October 2013 October 2011	**University of Pavia**, Italy 110/110 *Master Degree in* Theoretical and Mathematical Physics Thesis: "Hadamard states for linearized gravity on asymptotically flat spacetimes" Advisor: Prof. Dr. Claudio Dappiaggi
April 2011 October 2007	**University of Pavia**, Italy 92/110 *Bechelor Degree in* Physics Thesis: "Produzione dei bosoni vettori W e Z negli esperimenti di LHC" Advisor: Prof. Dr. Claudio Conta

Awards, Grants and Fellowship

September 2020 October 2019	**Fellow of the National Institute of Nuclear Physics** INFN-TIFPA *project "Bell"*
September 2019 August 2017	**Fellow of the German National Academic Foundation** DFG Graduiertenkolleg *GRK 1821 "Cohomological Methods in Geometry"*
March 2019	**Research in Pairs with Nicoló Drago** Oberwolfach
July 2018	**Centre de recherches mathématiques de l'Université de Montréal** CRM Applied Mathematics Laboratory
November 2015	**European Cooperation in Science and Technology** *COST Action MP 1405 "Quantum Structure of Spacetime"*
July 2017 April 2014	**Fellow of the German National Academic Foundation** DFG Graduiertenkolleg *GRK 1692 "Curvature, Cycles, and Cohomology"*

Employment

Current October 2019	**Postdoc position**, University of Trento Supported by a INFN-TIPFA *project "Bell"*
September 2019 August 2017	**Postdoc position**, University of Freiburg Funded by the project *"Boundary value problem for the Dirac operator"* Supported by a DFG Graduiertenkolleg *GRK 1821 "Cohomological Methods in Geometry"*
July 2017 April 2017	**Postdoc position**, University of Regensburg Funded by a DFG Graduiertenkolleg *GRK 1692 "Curvature, Cycles, and Cohomology"*

Research Visits

1-5 June 2020	Institut Mittag-Leffler, *scattering, microlocal analysis and renormalisation*
22 Sept. - 5 Oct. 2019	Kobi Kremnitzer and Federico Bambozzi, University of Oxford
8-12 April 2019	Emanuela Radici, University of L'Aquila
17-20 December 2018	Nicola Pinamonti, University of Genova
28 May -1 June 2018	Federico Bambozzi, University of Regensburg
12-16 February 2018	Federico Bambozzi, University of Regensburg
12-14 July 2017	Nicola Pinamonti, University of Genova
8-11 May 2017	Giuseppe Dito and Jose-Luis Jaramillo, University of Bourgogne
24 Oct - 8 Nov 2016	Giuseppe De Nittis, Pontificia Universidad Católica de Chile
10-25 October 2015	Alexander Schenkel, Heriot-Watt University
1-12 September 2015	Erwin Schrödinger Institute, *Modern theory of wave equations*
12-15 Juanary 2015	Claudio Dappiaggi, University of Pavia
21-25 Juanary 2014	Claudio Dappiaggi, University of Pavia

Conference and Workshop organization

16-18 April 2019	**Algebraic and Geometric Aspects in Quantum Field Theory** University of Freiburg
24-26 Sept. 2018	**Analysis of Differential Operators on Manifolds** University of Freiburg

Invited Talks

Conferences and Workshops

2019	**Symmetric systems on manifolds** Conference: *Cross-diffusion systems, gradient flows, and their perturbations* L'Aquila, Italy
2018	**On the Cauchy problem for the Dirac operator on Lorentzian spin manifolds** Conference: *Journées nancéiennes de géométrie* Nancy, France

2017 | **A taste of microlocal analysis on supermanifolds**
WORKSHOP: *Microlocal analysis: a tool to explore a quantum world*
Genoa, Italy

Seminars

2018 | **On the Cauchy problem for the Dirac operator**
Seminario di Fisica Matematica
University of Genova

2017 | **On the initial-boundary value problem for symmetric positive systems**
Seminar über Mathematische Physik
University of Regensburg

Linearized gravity and Hadamard states
Séminaires Math-Physique
University of Bourgogne

Looking at the quantum states with the eyes of algebraic quantum field theory
Seminario di Fisica Matematica
University of Roma 3

2016 | **Is there a natural state for Abelian Chern-Simons theory?**
Seminario di Fisica Matematica
University of Genova

On the algebraic approach to quantum Dirac fields
Coloquio de Matemática UC
Pontificia Universidad Católica de Chile

A novel way of constructing Hadamard states in absence of symmetry
Seminiario de Teoria Espectral
Pontificia Universidad Católica de Chile

On quasi-free states on CAR algebras and the Fermionic Signature Operator
Münchner Mathematische
LMU München

2015 | **Introduction to Microlocal Analysis**
Seminars of Analysis and Nonlinear Partial Differential Equations
Friedrich-Alexander-Universität Erlangen-Nürnberg

A new construction of algebraic states for CAR algebras
Seminars of Mathematical Physics
Heriot-Watt University

Hadamard states in a time-dependent external potential
Seminario di Fisica Matematica
University of Genova

2014 | **The fermionic projector on globally hyperbolic spacetimes**
Seminario di Fisica Matematica
University of Pavia

Teaching

July 2020 October 2019	**Mathematical Aspects of Quantum and Classical Physical Theories** Seminars at the University of Trento
February 2019 October 2018	**Operator Algebras and Quantum Field Theory** Seminars at the University of Freiburg
July 2018 April 2018	**Operator Algebra and Quantum Mechanics** Seminars at the University of Freiburg
February 2018 October 2017	**Microlocal Analysis** Seminars at the University of Freiburg
July 2017 April 2017	**Analysis II for Physicists** Tutoring at the University of Regensburg
June 2013 March 2013	**Physics for Biologists** Tutoring at the University of Pavia

Research Papers

Peer-review articles

8. **"Invariant states on noncommutative tori"**
   accepted in *International Mathematics Research Notices* (2020)
   (with F. Bambozzi and N. Pinamonti)
7. **"The Fermionic Signature Operator in De Sitter Spacetime"**
   Journal of Mathematical Analysis and Applications (2020) vol 485: 123808
   (with C. Dappiaggi, F. Finster and E. Radici)
6. **"A new class of Fermionic Projectors: Møller operators and mass oscillation properties"**
   Letters in Mathematical Physics (2017) vol 117: 2433–2451
   (with N. Drago)
5. **"The Fermionic Signature Operator and Quantum States in Rindler Space-time"**
   Journal of Mathematical Analysis and Applications (2017) vol 454: 385-411
   (with F. Finster and C. Röken)
4. **"Non-existence of natural states for Abelian Chern-Simons theory"**
   Journal of Geometry and Physics (2017) vol 116: 119-123
   (with C. Dappiaggi and A. Schenkel)
3. **"Wavefront sets and polarizations on supermanifolds"**
   Journal of Mathematical Physics (2017) vol 58: 023504
   (with C. Dappiaggi, H. Gimperleinand A. Schenkel)
2. **"The fermionic projector in a time-dependent external potential: mass oscillation property and Hadamard states"**
   Journal of Mathematical Physics (2016) vol 57: 072303
   (with F. Finster and C. Röken)
1. **"Radiative observables for linearized gravity on asymptotically flat spacetimes and their boundary induced states"**
   Journal of Mathematical Physics (2014) vol 55: 082301
   (with M. Benini and C. Dappiaggi)

Pre-print

2. **"On the uniqueness of invariant states"**
   arXiv:1906.09766 [math.OA] (2019). (with F. Bambozzi)
1. **"The well-posedness of the Cauchy problem for the Dirac operator on globally hyperbolic manifolds with timelike boundary"**
   arXiv:1806.06544 [math.DG] (2018) (with N. Große)

References

Prof. Dr. C. Dappiaggi | *Dipartimento di Fisica, Università di Pavia*
Via Bassi 6, 27100 Pavia, Italy
claudio.dappiaggi@unipv.it

Prof. Dr. F. Finster | *Fakultät für Mathematik, Universität Regensburg*
Universitätsstraße 31, 93053 Regensburg, Germany
finster@ur.de

Prof. Dr. C. Gérard | *Département de Mathématiques, Université Paris-Sud*
Bât. 425, F-91405 Orsay Cedex ,France
christian.gerard@math.u-psud.fr

Prof. Dr. V. Moretti | *Dipartimento di Matematica, Università di Trento*
Via Sommarive 14, 38123 Povo, Italy
valter.moretti@unitn.it

Prof. Dr. N. Pinamonti | *Dipartimento di Matematica, Università di Genova*
Via Dodecaneso 35, 16146 Genova, Italy
pinamont@dima.unige.it

Trento
March 16, 2020