

Simone MURRO

Dipartimento di Matematica
Università degli studi di Trento
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SCIENTIFIC INTERESTS

PHYSICS Classical and Quantum Field Theory on Curved Spacetimes, General Relativity
MATH Differential Geometry, Microlocal Analysis, Mathematical Physics, Operator Algebras

EDUCATION

APRIL 2017	University of Regensburg, Germany, Magna cum laude <i>Ph.D. Degree in MATHEMATICS</i> Thesis: “Quantum states on the algebras of Dirac fields: A functional analytic approach” Advisor: Prof. Dr. Felix FINSTER Coadvisor: Prof. Dr. Claudio DAPPIAGGI
APRIL 2014	
OCTOBER 2013	University of Pavia, Italy 110/110 <i>Master Degree in THEORETICAL AND MATHEMATICAL PHYSICS</i> Thesis: “Hadamard states for linearized gravity on asymptotically flat spacetimes” Advisor: Prof. Dr. Claudio DAPPIAGGI
OCTOBER 2011	
APRIL 2011	University of Pavia, Italy 92/110 <i>Bachelor Degree in PHYSICS</i> Thesis: “Produzione dei bosoni vettori W e Z negli esperimenti di LHC” Advisor: Prof. Dr. Claudio CONTA
OCTOBER 2007	

AWARDS, GRANTS AND FELLOWSHIP

SEPTEMBER 2021	Fellow of the German National Academic Foundation DFG Research Fellowship
OCTOBER 2020	
SEPTEMBER 2020	Fellow of the National Institute of Nuclear Physics INFN-TIFPA project “Bell”
OCTOBER 2019	
SEPTEMBER 2019	Fellow of the German National Academic Foundation DFG Graduiertenkolleg GRK 1821 “Cohomological Methods in Geometry”
AUGUST 2017	
MARCH 2019	Research in Pairs with Nicolás 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	Fellow of the German National Academic Foundation DFG Graduiertenkolleg GRK 1692 “Curvature, Cycles, and Cohomology”
APRIL 2014	

EMPLOYMENT

<i>Current</i> 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, <i>scattering, microlocal analysis and renormalisation</i>
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, <i>Modern theory of wave equations</i>
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: <i>Cross-diffusion systems, gradient flows, and their perturbations</i> L’Aquila, Italy
2018	On the Cauchy problem for the Dirac operator on Lorentzian spin manifolds CONFERENCE: <i>Journées nancéiennes de géométrie</i> Nancy, France

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

Seminars

2020 | **On the Cauchy problem for symmetric hyperbolic systems**
Seminar über Mathematische Physik
University of Regensburg

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

Seminario 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

PH.D. STUDENTS

CURRENT OCTOBER 2019	Daniele Volpe project: TBA Co-supervisor at University of Trento (supervisor Prof. Valter Moretti)
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RESEARCH PAPERS

Peer-review articles

9. **“The well-posedness of the Cauchy problem for the Dirac operator on globally hyperbolic manifolds with timelike boundary”**
accepted in *Documenta Mathematica* (2020) vol 25: 737-765
(with N. Große)
8. **“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)
7. **“Invariant states on noncommutative tori”**
accepted in *International Mathematics Research Notices* (2019)
(with F. Bambozzi and N. Pinamonti)
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. Gimperlein and 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

3. **“On the Cauchy problem for Friedrichs systems on globally hyperbolic manifolds with time-like boundary”**
 arXiv:2007.02544 [math.AP] (2020). (with N. Ginoux)
2. **“Intertwining operators for symmetric hyperbolic systems on globally hyperbolic manifolds”**
 arXiv:2004.03300 [math.DG] (2020). (with D. Volpe)
1. **“On the uniqueness of invariant states”**
 arXiv:1906.09766 [math.OA] (2019). (with F. Bambozzi)

REFERENCES

Prof. Dr. C. Dappiaggi	<i>Dipartimento di Fisica, Università di Pavia</i> Via Bassi 6, 27100 Pavia, Italy claudio.dappiaggi@unipv.it
Prof. Dr. F. Finster	<i>Fakultät für Mathematik, Universität Regensburg</i> Universitätsstraße 31, 93053 Regensburg, Germany finster@ur.de
Prof. Dr. C. Gérard	<i>Département de Mathématiques, Université Paris-Sud</i> Bât. 425, F-91405 Orsay Cedex, France nicolas.ginoux@univ-lorraine.fr
Prof. Dr. V. Moretti	<i>Dipartimento di Matematica, Università di Trento</i> Via Sommarive 14, 38123 Povo, Italy valter.moretti@unitn.it

Trento
July 10, 2020