



Matteo Gallone
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Address
Via Bonomea 265
34136 Trieste, Italy

Last update: October
5, 2018

Matteo Gallone

PhD candidate

About Me Currently I am a PhD candidate in Geometry and Mathematical Physics at SISSA in Trieste (Italy). I am also affiliated with the INdAM-GNFM, the national group of Mathematical Physics.

My scientific interests are in the edge between Theoretical and Mathematical Physics in both classical and quantum mechanics.

Education

2015 - Present, SISSA (Trieste)

PhD candidate in Geometry and Mathematical Physics.

Advisor: Alessandro Michelangeli

2013 - 2015, Università degli Studi di Padova

Master degree in Physics.

Thesis title: *Hydrodynamics of the FPU problem and its integrable aspects*

Advisor: Antonio Ponno

Dissertation: 23 September 2015

2010 - 2013, Università degli Studi di Padova

Bachelor degree in Physics.

Thesis title: *Gauss's least constraint principle: geometrical and mechanical aspects*

Advisors: Franco Cardin, Kurt Lechner

Dissertation: 16 July 2013

Research Interests

- Operator Theory
 - Kreĭn-Višik-Birman extension theory
 - Dirac-Coulomb operators
 - Contact and point interactions
 - Quantum confinement
- Hamiltonian systems
 - Perturbation theory
 - Fermi-Pasta-Ulam-Tsingou problem

Publications

Published

- [1] M. Gallone, *Self-adjoint extensions of Dirac-Coulomb operator*, in *Advances in Quantum Mechanics*, G. Dell'Antonio and A. Michelangeli, eds., vol. 18 of INdAM-Springer series, Springer International Publishing, pp. 169-185.
- [2] M. Gallone, A. Michelangeli, *Self-adjoint realisations of the Dirac-Coulomb Hamiltonian for heavy nuclei*, in *Analysis and Mathematical Physics* (2018), <https://doi.org/10.1007/s13324-018-0219-7>
- [3] M. Gallone, A. Michelangeli, *Discrete spectra for critical Dirac-Coulomb Hamiltonians*, in *Journal of Mathematical Physics*, Vol. 59, Issue 6, <https://doi.org/10.1063/1.5011305>



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Submitted

- [4] M. Gallone, A. Michelangeli, A. Ottolini, *Kreĭn-Višik-Birman self-adjoint extension theory revisited*, submitted to: Documenta Mathematica
- [5] M. Gallone, A. Michelangeli, *Hydrogenoid spectra with central perturbations*, arXiv:1807.01933, submitted to Analysis, Geometry and Mathematical Physics
- [6] M. Gallone, A. Michelangeli, E. Pozzoli, *On geometric quantum confinement in Grushin-type manifolds*, arXiv:1809.06805

Ongoing projects in their final stage

- [7] M. Gallone, A. Ponno, B. Rink, *An integrable normal form for the Fermi-Pasta-Ulam system*
- [8] M. Gallone, A. Michelangeli, E. Pozzoli, *Classification of Grushin-type Hamiltonians*

Conferences/Workshops/Schools

Invited at conferences

- *Mathematical Challenges of zero range physics: rigorous results and open problems*, Rome (Italy), 9 - 13 July 2018
- *International Workshop on PDEs: Analysis and Modelling*, Zagreb (Croatia), 17 - 20 June 2018
- *Il problema di Fermi-Pasta-Ulam: stato dell'arte e prospettive*, Padova (Italy), 12 - 14 April 2018

Participation to conferences

- *International Congress on Mathematical Physics*, McGill University, Montreal (Canada), 23 - 27 July 2018
- *Young Researchers Symposium*, McGill University, Montreal (Canada), 20 - 21 July 2018
- *Junior Trieste Quantum Days*, Trieste (Italy), 11, 18 May 2018
- *Junior Math Days*, Trieste (Italy), 6 - 10 May 2018
- *Mathematical Challenges in Quantum Mechanics*, Rome (Italy), 19 - 24 February 2018
- *Trails in Quantum Mechanics and Surroundings*, Trieste (Italy), 29 - 30 January 2018
- *Insubria Summer School in Mathematical Physics. Spectral and scattering theory: from selfadjoint operators to boundary value problems*, Como (Italy), 18 - 22 September 2017;
- *Junior Trieste Quantum Days 2017*, Trieste (Italy), 12, 19 May 2017;
- *Spectral Days 2017*, Stuttgart (Germany), 3 - 7 April 2017;
- *Workshop on Macroscopic Limits of Quantum Systems*, München (Germany), 30 March - 1 April 2017;
- *Trieste Quantum Days 2017*, Trieste (Italy), 20 - 24 February 2017;
- *Linear and Nonlinear Dirac Equation: advances and open problems*, Como (Italy), 8 - 10 February 2017;
- *OTIND - Operator Theory and Indefinite Inner Product Spaces*, Wien (Austria), 17 - 20 December 2016;
- *Mathematical Challenges of Zero-range physics: rigorous results and open problems*, Trieste (Italy), 7 - 10 November 2016
- *Summer School: Universality, Scaling Limits and Effective Theories*, Rome (Italy), 11 - 15 July 2016;



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- *Contemporary Trends in the Mathematics of Quantum Mechanics*, Rome (Italy), 4 - 8 July 2016;
- *Trieste Quantum Days*, Trieste (Italy), 21 - 23 June 2016;
- *Mathematical Challenges in Quantum Mechanics*, Bressanone (Italy), 8 - 13 February 2016.

Scientific visits

- 11-12 December 2017, Milan, I worked with **Diego Noja** on Dirac-Coulomb Hamiltonians;
- 20-22 November 2017, Como, I worked with **Andrea Posilicano** and **Claudio Cacciapuoti** on Dirac-Coulomb Hamiltonians;
- 4-8 July 2017, Padova, I worked with **Antonio Ponno** and **Giancarlo Benettin** on the adiabatic piston;
- December 2016, Amsterdam, I worked with **Bob Rink** on *Integrable dynamics of FPU chain*;
- July 2015, Utrecht, I worked with **Bob Rink** and **Antonio Ponno** on *Integrable dynamics of FPU chain*;

Organisational Responsibilities

- I am one of the organisers of the *Junior Math Days 2018* in SISSA (17 - 19 December 2018).
- I was one of the organisers of the *Junior Quantum Days 2018* at University of Trieste (11, 18 May 2018).
- I was one of the organisers of the *Junior Math Days 2018* in SISSA (6 - 10 May 2018).
- I was one of the organisers of the *Geometry and Mathematical Physics Student Seminars* in SISSA for the academic year 2017/2018.
- I was one of the organisers of the *Analysis, Math-Phys and Quantum Seminars* in SISSA for the academic year 2016/2017.
- Representative of students in Department council, Didactic Commission and Council of the course of studies for Physics at Università di Padova for the academic years 2013-2015.

Teaching

Introduzione alle Equazioni Differenziali alle Derivate Parziali

Spring 2015, Università degli studi di Padova

High school teacher - Mathematics

November - December 2014, Liceo Artistico Statale M. Guggenheim (Venezia)

Supervised Students

AA 2017/2018 - M. Marian (University of Trieste) - Bachelor Thesis

Advisors: Matteo Gallone and Stefano Ruffo

Thesis title: Tempi di Shock ed equipartizione nel modello di Fermi-Pasta-Ulam



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Scientific Communications

[Darwin-like perturbations of the Hydrogen Spectra](#)

11 July 2018, Mathematical Challenges of zero range physics: rigorous results and open problems (Rome)

[Fermi–Pasta–Ulam–Tsingou: When Paradox Turns into Discovery](#)

22 June 2018, Geo & Math Phys Student Seminars (SISSA)

[Dirac Operators With Coulomb Interaction](#)

18 June 2018, International Workshop on PDEs: Analysis and Modelling (Zagreb)

[The touchy business of formal computations](#)

18 May 2018, Trieste Junior Quantum Days 2018 (Università di Trieste)

[FPU and KdV Hierarchy](#)

13 April 2018, Il problema di Fermi-Pasta-Ulam: stato dell'arte e prospettive (Scuola Galileiana, Padova)

[Self-adjoint realisations of the Dirac-Coulomb Operator](#)

19 February 2018, Mathematical Challenges in Quantum Mechanics (La Sapienza, Roma)

[Discrete Spectra and Self-Adjointness for Critical Dirac-Coulomb](#)

12 December 2017, Università Milano Bicocca (Milano)

[Self-adjoint realisations of Dirac-Coulomb operators](#)

24 November 2017, SISSA (Trieste), AJS Seminar

[Self-adjoint realisations of the Dirac operator with Coulomb interaction](#)

24 May 2017, SISSA (Trieste), AMPQ Seminar

[Self-adjoint realisations of the Dirac-Coulomb Hamiltonian](#)

12 May 2017, ICTP (Trieste), Junior Trieste Quantum Days

[A brief journey in Mathematical Physics](#)

25 April 2017, Università di Padova

Languages

Italian: mother tongue

English: good command

Computer Skills

[Intermediate Knowledge](#)

C++ , Mathematica, html, Microsoft Excel, Latex

[Basic Knowledge](#)

Python, C#, Visual Basic

References