

Serena CENATIEMPO

PERSONAL DATA

BIRTH: Napoli (IT) – December 20, 1983
CITIZEN: Italian
CIVIL STATUS: married, one child born on 31/10/2015
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ORCID: 0000-0002-8667-8300
LANGUAGES: Italian (mother tongue), English (fluent),
German (intermediate), French (elementary)



ACADEMIC POSITIONS

03/2016 – present	<i>Gran Sasso Science Institute, School of advanced studies (IT), Postdoc, Mathematics Area</i>
11/2015 – 03/2016	<i>Maternity leave</i>
02/2014 – 10/2015	<i>Institute of Mathematics, University of Zurich (CH), Postdoc, research group of Prof. Benjamin Schlein</i>
06/2013 – 01/2014	<i>Hausdorff center for Mathematics, University of Bonn (DE), Hausdorff postdoc, research group of Prof. Benjamin Schlein</i>
11/2012 – 05/2013	<i>Department of Mathematics, University of Roma Tre (IT), Research fellow, research group of Prof. Alessandro Giuliani</i>

EDUCATION

02/2013	<i>Ph.D. degree – Sapienza, University of Rome (IT)</i> Thesis: Low dimensional interacting bosons Advisor: Prof. Alessandro Giuliani. Final Mark: excellent
10/2008	<i>Master degree, University of Napoli Federico II (IT)</i> Thesis: Models for metastable states, resonances and anelastic scattering in Quantum Mechanics Advisor: Prof. Rodolfo Figari Final Mark: 110/110 cum laude
03/2006	<i>Bachelor degree, University of Napoli Federico II (IT)</i> Thesis: Models for the measurement process in Quantum Mechanics Advisor: Prof. Rodolfo Figari Final Mark: 110/110 cum laude

AWARDS AND HONORS

2018 Invited speaker for the topical session Equilibrium Statistical Mechanics of the *International Congress on Mathematical Physics*, Montreal (CA)

FELLOWSHIPS

- 2018 Cambridge Philosophical Society (CPS) bursary at Isaac Newton Institute
- Spring 2015 Selected for the GSSI postdoc fellowship, GSSI L'Aquila (IT)
- Spring 2013 Selected for the Hausdorff Postdoc fellowship, Hausdorff Center for Mathematics, University of Bonn (DE)
- March 2011 Oberwolfach Leibniz Graduate Student, workshop *The Renormalization Group*
- 11/2008 - 10/2011 Ph.D. scholarship, Sapienza University of Rome

DISTINGUISHED VISITING PERIODS

- 2019 Mittag-Leffler Institute, Djursholm (SE), 1 month
within the program *Spectral methods in Mathematical Physics*
- 2018 Isaac Newton Institute, Cambridge (UK), 3 weeks
within the program *Scaling limits, rough paths, quantum field theory*
- CRM Montreal (CA), 1 week
within the program *Mathematical challenges in many-body physics and quantum information*
- 2012 Hausdorff Center for Mathematics, Bonn (DE), 3 weeks
within the program *Mathematical challenges of materials science and condensed matter physics: from quantum mechanics through statistical mechanics to nonlinear PDE*

INVITED LECTURES

- July 2017 Lecture on "From the quantum many particle system to the non-linear Schrödinger equation", within the graduate school on *Non linear dispersive PDE, quantum many particle systems and the world between*, Cortona (IT)
- Sep. 2016 Short class on "Gross-Pitaevskii equation from Quantum Dynamics"
Sapienza, Universit di Roma (IT)
- Apr. 2015 Two lectures on "Quantum Fluctuations around the GrossPitaevskii Dynamics"
University of Stuttgart (DE)

SELECTED TALKS

- 2018 - Meeting of the Italian Association in Mathematical Physics (GNFM), Montecatini (IT) - *contributed talk*
- Many-Body Quantum Mechanics, Montreal (CA) - *invited speaker*
- International Conference on Mathematical Physics, Montreal (CA)
invited speaker for the session Equilibrium Statistical Mechanics
- 2017 - Mathematical Questions and Challenges in Quantum Electrodynamics and its Applications, Oberwolfach (DE) - *invited speaker*
- Quantissima in the Serenissima II, Venice (IT) - *invited speaker*
- Non linear dispersive PDE, quantum many particle systems and the world between, Cortona (IT) - *invited speaker*
- Trieste Quantum Days 2017, Trieste (IT) - *invited speaker*

- 2016 - Sapienza, University of Rome (IT) - *seminar*
 - Contemporary Trends in the Mathematics of Quantum Mechanics, Rome (IT) - *invited speaker*
 - SISSA, Trieste (IT) - *seminar*
 - GSSI, L'Aquila (IT) - *seminar*
- 2015 - Renormalization in Statistical Physics and Lattice Field Theories, Montpellier (FR) - *invited speaker*
 - Trials in Quantum Mechanics and Surroundings 2015, Como (IT) - *invited speaker*
 - LMU, Munich (DE) - *seminar*
- 2014 - Mathematical Physics, Analysis and Stochastics, Heidelberg (DE) - *contributed talk*
 - Many-Body Quantum Systems, Warwick (UK) - *invited speaker*
 - University of Roma Tre (IT) - *seminar*
- 2013 - ETH-Zurich (CH) - *seminar*
- 2012 - University of Milano (IT) - *seminar*
 - International Congress on Mathematical Physics 2012, Aalborg (DK), *contributed talk*
 within the topical session *Quantum many-body theory and condensed matter physics*
 - Quantum Mechanics and surroundings, L'Aquila (IT) - *contributed talk*

EVENTS BY INVITATION

- Sep. 2019 Workshop *Many-Body Quantum Systems and Effective Theories*, Oberwolfach (DE) - 1 week
- Sep. 2018 Workshop *Many-Body Quantum Mechanics*, Montreal (CA) - 1 week
- Sep. 2017 Workshop *Mathematical Questions and Challenges in Quantum Electrodynamics and its Applications*, Oberwolfach (DE) - 1 week
- Sep. 2016 Workshop *Many-Body Quantum Systems and Effective Theories*, Oberwolfach (DE) - 1 week
- Feb. 2013 Workshop *Equilibrium statistical mechanics*, CIRM Marsiglia (FR) - 1 week
- May 2016 Workshop *The Renormalization Group*, Oberwolfach (DE) - 1 week
- Mar. 2011 Workshop *The Renormalization Group*, Oberwolfach (DE) - 1 week

BRIEF RESEARCH SUMMARY

I am interested in the rigorous mathematical analysis of problems arising in the study of interacting many particle systems, both in the quantum and classical context. So far, my research projects have regarded the study of equilibrium and not equilibrium properties of interacting bosons in three and two dimensions. More precisely I have investigated:

- the dynamics of the Bose gas, and in particular the derivation of effective equations for the dynamics of Bose-Einstein condensates, starting from the first principles of the many-body quantum dynamics and considering physically relevant limiting regimes (mean field and Gross-Pitaevskii scalings);
- the equilibrium properties of weakly interacting bosons, including the problem of proving condensation and Bogoliubov prediction for the ground state energy and low energy excitations, by means of Renormalization Group and functional analysis techniques;
- low energy limit and fluctuations in models for neutron scattering, starting from the quantum Lorentz Gas with Gross-Pitaevskii interactions.

- [1] *Bogoliubov Theory in the Gross-Pitaevskii Limit*,
with C. Boccato, C. Brennecke and B. Schlein,
math-ph/1801.01389
- [2] *Universal low-energy behaviour in a quantum Lorentz gas with Gross-Pitaevskii potentials*,
with G. Basti and S. Teta,
Math. Phys. Anal. Geom. 21(11) (2018)
- [3] *The excitation spectrum of Bose gases interacting through singular potentials*,
with C. Boccato, C. Brennecke and B. Schlein, math-ph/1704.04819
Accepted for publication on J. Eur. Math. Soc. (2018)
- [4] *Complete Bose-Einstein condensation in the Gross-Pitaevskii regime*,
with C. Boccato, C. Brennecke and B. Schlein,
Commun. Math. Phys. 359(3): 975-1026 (2018)
- [5] *Analysis of fluctuations around non linear effective dynamics*, contribution to
the volume “Advances in Quantum Mechanics: Contemporary Trends and Open Problems”,
G. Dell’Antonio and A. Michelangeli eds., Springer-INdAM series (2017)
- [6] *Quantum Many-Body Fluctuations Around Nonlinear Schrödinger Dynamics*,
with C. Boccato and B. Schlein,
Ann. Henri Poincaré 18: 113 (2017)
- [7] *Renormalization theory of a two dimensional Bose gas:
quantum critical point and quasi-condensed state*,
with A. Giuliani, Jour. Stat. Phys. 157, 755-829 (2014)
- [8] *Low dimensional interacting bosons*.
PhD Thesis, math-ph/1211.3772 (2013)

TEACHING

- 2017 – 2018 Ph.D classes held at GSSI, L’Aquila (IT)
 - *Introduction to quantum many particle problems*
 - *Effective equations for many body quantum systems*
 - *Bose-Einstein condensation and Bogoliubov theory*
- 2014 – 2015 Teaching assistant at the Institute of Mathematics, University of Zurich (CH)
 - *Analysis 3* (2nd year class, ODEs and measure theory)
 - *Thomas–Fermi and Hartree–Fock theory for atoms and molecules*
(Master and PhD course)
- 2010 – 2012 Teaching assistant at University Campus Biomedico, Rome (IT)
 - *Mechanics and Thermodynamics* (1st year class - Department of Engineering)
 - *Physics 1* (1st year class, Mechanics, Thermodynamics, Electromagnetism
and Optics - Department of Medicine)

REVIEWING ACTIVITY

- Referee for the following international journals: *Annales Henri Poincaré*, *Communications in Mathematical Physics*, *Journal of Statistical Physics*, *Review in Mathematical Physics*
- Referee for Springer proceedings series

ORGANIZATIONAL ACTIVITIES

Part of the scientific and organizing committee for the following workshops and schools:

- Gran Sasso Quantum Meetings: from many particle systems to quantum fluids,
GSSI L'Aquila (IT), November 28- December 1, 2018
- EMS-IAMP Summer School in Mathematical Physics Universality in Probability Theory
and Statistical Mechanics, *Ischia (IT) June 11-15, 2018*
- Women in applied and computational Mathematics,
GSSI L'Aquila (IT), May 9-11, 2018

MEMBERSHIP OF MATHEMATICAL ASSOCIATIONS

- 2012 – to date International Association of Mathematical Physics (IAMP)
2010 – to date Gruppo Nazionale Fisica Matematica (GNFM)
Italian National Group of Mathematical Physics

REFERENCES

- Prof. Alessandro Giuliani Dipartimento di Matematica e Fisica, Università degli Studi Roma Tre
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- Prof. Benjamin Schlein Mathematics Institute, University of Zurich,
Winterthurerstrasse 190, CH-8057 Zurich
E-Mail: benjamin.schlein@math.uzh.ch
Tel.: +41 44 635 58 42
- Prof. Alessandro Teta Dipartimento di Matematica, La Sapienza Università di Roma
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