

Serena CENATIEMPO

PERSONAL DATA

BIRTH: Napoli (IT) – December 20, 1983
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LANGUAGES: Italian (mother tongue), English (fluent),
German (intermediate), French (elementary)



POSITIONS

03/2016 – present	Postdoc , Mathematics Area, Gran Sasso Science Institute (IT)
11/2015 – 03/2016	Maternity leave from University of Zurich (CH)
02/2014 – 10/2015	Postdoc , Institute of Mathematics, University of Zurich (CH) Research group of Prof. Benjamin Schlein
06/2013 – 01/2014	Postdoc , Hausdorff center for Mathematics, University of Bonn (DE) Research group of Prof. Benjamin Schlein
11/2012 – 05/2013	Research fellow , Department of Mathematics, University of Roma Tre (IT) Research Group of Prof. Alessandro Giuliani, in the team of the ERC Starting Grant 2009 CoMBos (Collective Phenomena in Classical and Quantum Many Body Systems)

EDUCATION

02/2013	Ph.D. degree – Sapienza, University of Rome (IT) <i>Thesis: Low dimensional interacting bosons</i> Advisor: Prof. Alessandro Giuliani.
10/2008	Master degree , University of Napoli Federico II (IT) <i>Thesis: Modelli di stati metastabili, risonanze e scattering anelastico in Meccanica Quantistica</i> Advisor: Prof. Rodolfo Figari Final Mark: 110/110 cum laude
03/2006	Bachelor degree , University of Napoli Federico II (IT) <i>Thesis: Modelli per il processo di misura in Meccanica Quantistica</i> Advisor: Prof. Rodolfo Figari Final Mark: 110/110 cum laude

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.

- [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. (2017)
- [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)

FORTHCOMING TALKS AND VISITS

- Invited speaker for the topical session *Equilibrium Statistical Mechanics*
of the International Congress on Mathematical Physics (ICMP) 2018,
Montreal (CA) - July 23-28, 2018
- Invited speaker for the Workshop *Many-Body Quantum Mechanics*,
part of the thematic semester on
Mathematical challenges in many-body physics and quantum information,
CRM Montreal (CA) - September 10-14, 2018
- Invited participant to the Isaac Newton Institute program
Scaling limits, rough paths, quantum field theory,
Cambridge (UK) - September-December 2018
- Invited participant to the Mittag-Leffler program
Spectral methods in Mathematical Physics,
Djursholm (SE) - January-April 2019

INVITED TALKS

- 2017 - Mathematical Questions and Challenges in Quantum Electrodynamics and its Applications, Oberwolfach (DE) - *workshop*
- Quantissima in the Serenissima II, Venice (IT) - *conference*
- Non linear dispersive PDE, quantum many particle systems and the world between, Cortona (IT) - *graduate school*
- Trieste Quantum Days 2017, Trieste (IT) - *conference*

- 2016 - Sapienza, University of Rome (IT) - *three lecture talks and seminar*
- Contemporary Trends in the Mathematics of Quantum Mechanics, Rome (IT) - *conference*
- SISSA, Trieste (IT) - *seminar*
- GSSI, L'Aquila (IT) - *seminar*

- 2015 - Renormalization in Statistical Physics and Lattice Field Theories, Montpellier (FR) - *conference*
- Trials in Quantum Mechanics and Surroundings 2015, Como (IT) - *conference*
- LMU, Munich (DE) - *seminar*
- University of Stuttgart (DE), *two lecture talks*

- 2014 - Many-Body Quantum Systems, Warwick (UK) - *conference*
- University of Roma Tre (IT) - *seminar*

- 2013 - ETH-Zurich (CH) - *seminar*

- 2012 - University of Milano (IT) - *seminar*

CONTRIBUTED TALKS

- 2014 - Mathematical Physics, Analysis and Stochastics, Heidelberg (DE) - *conference*

- 2012 - International Congress on Mathematical Physics 2012, Aalborg (DK), talk within the topical session *Quantum many-body theory and condensed matter physics*
- Quantum Mechanics and surroundings, L'Aquila (IT) - *conference*

EVENTS BY INVITATIONS AND VISITS

- 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

- May 2016 Workshop *The Renormalization Group*, Oberwolfach (DE) - 1 week

- Nov. 2012 University of Rouen (FR), by invitation of Dr. Margherita Disertori - 1 week

- May 2012 Hausdorff Trimester Program *Mathematical challenges of materials science and condensed matter physics: From quantum mechanics through statistical mechanics to nonlinear pde* University of Bonn (DE) - 3 weeks

- Mar. 2011 Workshop *The Renormalization Group*, Oberwolfach (DE) - 1 week

PARTICIPATION TO CONFERENCES AND WORKSHOPS

- 2016 - Condensed Matter and Critical Phenomena, Frascati (IT) - *conference*
- 2015 - Constructive Renormalization: A conference in memory of Pierluigi Falco, Frascati (IT) - *conference*
- 2014 - Mathematical physics and quantum mechanics, Zurigo (CH) - *conference*
 - Scaling limits and effective theories in classical and quantum mechanics, Vienna (AT) - *conference*
 - Selected Problems in Mathematical Physics, La Spezia (IT) - *conference*
 - Solid Math 2014, Trieste (IT) - *conference*
- 2013 - Trails in Quantum Mechanics and surroundings, Frascati (IT) - *conference*
 - Dispersive PDEs: Models and Dynamics, Pisa (IT) - *conference*
 - QMATH12. Mathematical Results in Quantum Mechanics, Berlino (DE) - *conference*
 - Mathematical properties of large quantum systems, IHP Parigi (FR) - *conference*
 - Equilibrium statistical mechanics, CIRM Marsiglia (FR) - *workshop*
- 2012 - Mechanics: classical, statistical and quantum. A conference in honor of the 70th birthday of Giovanni Gallavotti, Roma(IT) - *conference*
 - Meccanica Quantistica e dintorni, L'Aquila (IT) - *conference*
- 2010 - Seminal interactions between mathematics and physics, Roma (IT) - *workshop*
 - Quantum Mechanics and surroundings, Roma (IT) - *workshop*
- 2009 - Quantum mechanics and algebraic geometry: an example of reciprocal influence between German and Italian science in the first half of XX century, Roma (IT) - *conference*
 - Recent Developments in Mathematical Physics, L'Aquila (IT) - *conference*

PARTICIPATION TO SCHOOLS

- 2018 - Second School and Workshop: Mathematical Challenges in Quantum Mechanics, Roma (IT) - 1 week
- 2017 - Graduate school: Nonlinear dispersive PDE, quantum many particle systems and the world between, Cortona (IT) - 2 weeks
- 2014 - Summer School: Mathematical Physics, Analysis and Stochastics, University of Heidelberg (DE) - 1 week
- 2013 - Summer school: Current Topics in Mathematical Physics, Centre international de rencontres mathématiques (CIRM), Marsiglia (FR) - 1 week
- 2011 - Fourth School and Workshop: Mathematical Methods in Quantum Mechanics, Bressanone (IT) - 1 week
- 2010 - CIME Summer School: Quantum Many Body Systems, Cetraro (IT)
 - Summer School: Quantum Theory: from small to large scales, Les Houches (FR) - 3 weeks
- 2009 - Third School and Workshop: Mathematical Methods in Quantum Mechanics, Bressanone (IT) - 1 week

FELLOWSHIPS

March 2019	Mittag-Leffler fellowship (3 weeks), within the program <i>Spectral Methods in Mathematical Physics</i>
October 2018	Newton Institute fellowship (2 weeks), within the program <i>Scaling limits, rough paths, quantum field theory</i>
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)
May 2012	Hausdorff Center fellowship (3 weeks), within the Hausdorff Trimester Program
March 2011	Oberwolfach Leibniz Graduate Student, workshop <i>The Renormalization Group</i>
11/2008 - 10/2011	Ph.D. scholarship, Sapienza University of Rome

TEACHING

2017 – 2018	Ph.D classes held at GSSI, L'Aquila (IT) <ul style="list-style-type: none">· <i>Introduction to quantum many particle problems</i>· <i>Effective equations for many body quantum systems</i>· <i>Bose-Einstein condensation and Bogoliubov theory</i>
2014 – 2015	Teaching assistant at the Institute of Mathematics, University of Zurich (CH) <ul style="list-style-type: none">· <i>Analysis 3</i> (2nd year class, ODEs and measure theory)· <i>Thomas-Fermi and Hartree-Fock theory for atoms and molecules</i> (Master and PhD course)
2010 – 2012	Teaching assistant at University Campus Biomedico, Rome (IT) <ul style="list-style-type: none">· <i>Mechanics and Thermodynamics</i> (1st year class - Department of Engineering)· <i>Physics 1</i> (1st year class, Mechanics, Thermodynamics, Electromagnetism and Optics - Department of Medicine)

EDITORIAL AND ORGANIZATIONAL ACTIVITIES

- Part of the scientific and organizing committee for the following workshops and schools:
 - Workshop *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
 - Workshop *Women in applied and computational Mathematics*, GSSI L'Aquila (IT), May 9-11, 2018
- Referee for: *Annales Henri Poincaré*, *Communications in Mathematical Physics*, *Journal of Statistical Physics*, *Review in Mathematical Physics*

MEMBERSHIP OF MATHEMATICAL ASSOCIATIONS

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

Last update: May 7, 2018