

Serena CENATIEMPO

PERSONAL DATA

BIRTH: Napoli (IT) – December 20, 1983
CITIZEN: Italian
CIVIL STATUS: married, 2 children
born on 31/10/2015 and 4/7/2019
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ORCID: 0000-0002-8667-8300
LANGUAGES: Italian (mother tongue), English (fluent),
German (intermediate), French (elementary)



RESEARCH INTERESTS

Equilibrium and non-equilibrium properties of interacting quantum systems. Emergence of collective behavior in condensed matter systems. Derivation of effective evolution equations and effective theories for quantum many particles systems. Universality in many body quantum systems.

POSITIONS

	<i>Gran Sasso Science Institute, School of advanced studies (IT)</i>
11/2021 –	Assistant Professor (RtdB), Mathematics Area
02/2019 – 10/2021	Researcher (RtdA), Mathematics Area (on maternity leave from 6/6/2019 to 6/11/2019)
03/2016 – 01/2019	Postdoc, Mathematics Area
	<i>Institute of Mathematics, University of Zurich (CH)</i>
02/2014 – 03/2016	Postdoc, research group of Prof. Benjamin Schlein (on maternity leave from 31/10/2015 to 13/03/2016)
	<i>Hausdorff center for Mathematics, University of Bonn (DE)</i>
06/2013 – 01/2014	Hausdorff postdoc, research group of Prof. Benjamin Schlein
	<i>Department of Mathematics, University of Roma Tre (IT)</i>
11/2012 – 05/2013	Research fellow, research group of Prof. Alessandro Giuliani

DEGREES AND HABILITATIONS

05/2021	<i>Italian National Habilitation for Associate Professor in Mathematical Physics</i> (ASN, Settore concorsuale: 01/A4), valid until 31/5/2030
02/2013	<i>Ph.D. degree, Sapienza, University of Rome (IT)</i> Thesis: Low dimensional interacting bosons Advisor: Prof. Alessandro Giuliani.
10/2008	<i>Master degree (110/110 cum laude), University of Napoli Federico II (IT)</i> Thesis: Models for metastable states, resonances and anelastic scattering in Quantum Mechanics Advisor: Prof. Rodolfo Figari
03/2006	<i>Bachelor degree (110/110 cum laude), University of Napoli Federico II (IT)</i> Thesis: Models for the measurement process in Quantum Mechanics Advisor: Prof. Rodolfo Figari

HONORS

- 2022 Invited speaker to the One world Mathematical Physics Seminar (online)
- 2019 Invited speaker at the *XXI Congress of the Italian Mathematical Union*, Pavia (IT)
(Topical session: Mathematical Physics)
- 2018 Invited speaker at the *International Congress on Mathematical Physics 2018*, Montreal (CA)
(Topical session: Equilibrium Statistical Mechanics)

FELLOWSHIPS

- 2019 Mittag-Leffler fellowship, employed during the stay at Mittag-Leffler Institute Djursholm (SE), within the program *Spectral Methods in Mathematical Physics*
- 2018 Cambridge Philosophical Society (CPS) fellowship for early career researchers employed during the stay at the Isaac Newton Institute, Cambridge (UK)
within the program *Scaling limits, rough paths, quantum field theory*
- 2015 Selected for the GSSI postdoc fellowship, GSSI L'Aquila (IT)
- 2013 Selected for the Hausdorff Postdoc fellowship, HCM Bonn (DE)
- 2012 Hausdorff Center fellowship, employed during the stay at HIM, Bonn (DE) within the program *Mathematical challenges of materials science and condensed matter physics: from quantum mechanics through statistical mechanics to nonlinear pde*
- 2011 Oberwolfach Leibniz Graduate Student fellowship,
within the workshop *The Renormalization Group*

COORDINATION AND PARTICIPATION TO RESEARCH PROJECTS

- 2022 – 2024 P.I. for the project *Large-scale limits of many-body quantum systems*, funded by MUR (Italian University Ministry), 2 participants, approx. 100000 €
- 08/2019 – 07/2020 P.I. for the project *Derivation of effective theories for large quantum systems*, funded by the Italian Group for Mathematical Physics, 3 participants
- 05/2019 – 08/2019 Member of the project *Scaling Limits for Particle Systems*, selected for the *Junior Trimester Program on Kinetic Theory* at HIM, Bonn (DE), P.I.: C. Saffirio
- 04/2014 – 03/2016 Member of the project *Effective equations from quantum dynamics* (Swiss National Science Foundation Grant 200021_153621), P.I.: B. Schlein
- 01/2010 – 12/2014 Member of the project *CoMBoS - Collective Phenomena in Classical and Quantum Many Body Systems* (ERC Starting Grant 239694), P.I.: A. Giuliani

SUPERVISION AND TUTORING

- 11/2020 – Mentor for 1st year Ph.D. students at Gran Sasso Science Institute (cycle 36)
- 09/2020 – Ph.D. Tutor of Hamidreza Saberbaghi, Gran Sasso Science Institute (cycle 35)
(Ph.D. supervisor: Prof. Rodolfo Figari)
- 09/2018 – 01/2021 Ph.D supervisor of Cristina Caraci, Gran Sasso Science Institute (cycle 33),
co-supervision with Prof. Benjamin Schlein
Ph.D. thesis: *Bose-Einstein condensation for two dimensional interacting bosons: mean field and Gross-Pitaevskii scalings* (Defence date: June 11, 2021)
- 07/2017 Mentor within the Ph.D. school *INDAM-MSRI summer school: non linear dispersive PDEs, quantum many particle systems and the world between*, Cortona (IT)

- [1] *The excitation spectrum of two dimensional Bose gases in the Gross-Pitaevskii regime*
with C. Caraci and B. Schlein, in preparation.
- [2] *A second order upper bound for the ground state energy of a hard-sphere gas in the Gross-Pitaevskii regime*
with G. Basti, A. Olgiati, G. Pasqualetti and B. Schlein,
arXiv preprint: 2203.11917 .
- [3] *Ground state energy of a Bose gas in the Gross-Pitaevskii regime*
with G. Basti, A. Olgiati, G. Pasqualetti and B. Schlein,
arXiv preprint: 2202.10270. Accepted for publication on *J. Math. Phys.* (2022)
- [4] *Ground state energy of dilute Bose gases: a second order upper bound for non-smooth potentials*
with G. Basti and B. Schlein,
Forum Math. Sigma. 9 (2021)
- [5] *Bose-Einstein condensation for two dimensional bosons in the Gross-Pitaevskii regime*
with C. Caraci and B. Schlein,
J. Stat. Phys. 183(39), (2021)
- [6] *Optimal Rate for Bose-Einstein Condensation in the Gross-Pitaevskii Regime,*
with C. Boccato, C. Brennecke and B. Schlein,
Commun. Math. Phys 376, 1311–1395 (2020)
- [7] *Bogoliubov theory for dilute bose gases: the Gross-Pitaevskii Regime,*
contribution to the collection International Congress of Mathematical Physics 2018,
J. Math. Phys. 60(8): 081901 (2019)
- [8] *Bogoliubov Theory in the Gross-Pitaevskii Limit,*
with C. Boccato, C. Brennecke and B. Schlein,
Acta Mathematica 222(2), 219–335 (2019)
- [9] *The excitation spectrum of Bose gases interacting through singular potentials,*
with C. Boccato, C. Brennecke and B. Schlein,
J. Eur. Math. Soc. 22(7), 2331–2403 (2020)
- [10] *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)
- [11] *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)
- [12] *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)
- [13] *Quantum Many-Body Fluctuations Around Nonlinear Schrödinger Dynamics,*
with C. Boccato and B. Schlein,
Ann. Henri Poincaré 18: 113 (2017)
- [14] *Renormalization theory of a two dimensional Bose gas: quantum critical point and quasi-condensed state,*
with A. Giuliani,
J. Stat. Phys. 157, 755-829 (2014)
- [15] *Low dimensional interacting bosons.*
PhD Thesis, available on arXiv: 1211.3772

INVITED TALKS AND SEMINARS

- 2023 - Quantum Workshop in Toulouse (FR)
- 2022 - [Quantissima in the Serenissima IV](#), Venice (IT)
- [Risorgimento della vita felice](#), a celebration of Mathematical Physics, ETH Zurich (CH)
- [Ypatia 2022](#), Rome (IT)
- [Advances in Classical, Quantum and Statistical Mechanics](#), Rome (IT)
- [Oberseminar Stochastics](#), University of Bonn (DE)
- [One world Mathematical Physics Seminar](#), online
- [Indam Quantum Meeting, Workshop I](#), Politecnico di Milano (IT)
- [Sapienza, University of Rome \(IT\) - seminar](#)
- 2021 - [Large-scale limits of interacting particle systems](#), IHES (FR)
- [Schrödinger equations: normal forms, quantum mechanics, and nonlinear aspects](#), Le Croisic (FR) - (invitation declined due to the COVID-19 pandemic)
- [Online talk at Universidad de Pamplona](#) (COL)
- [Uniba Mathematical Physics seminar](#) (IT), online
- [Joint GSSI - La Sapienza Webinars on Statistical Mechanics](#) (IT), online
- [SISSA Analysis and Mathematical Physics Seminar](#), online
- 2020 - [Ypatia Conference: Mathematics between France and Italy](#) Rome (IT) (conference postponed due to the COVID-19 pandemic)
- [Munich-Aarhus-Santiago Seminar in Mathematical Physics](#), online
- [Spectral Theory and Quantum Mechanics](#), Aarhus University (DK) (conference canceled due to the COVID-19 pandemic)
- [Meeting of the Italian Association in Mathematical Physics \(GNFM\) Montecatini](#) (IT) (conference canceled due to the COVID-19 pandemic)
- 2019 - [The Analysis of Complex Quantum Systems: Large Coulomb Systems and Related Matters](#), CIRM (FR)
- [Congress of the Italian Mathematical Union](#) Pavia (IT) - *invited speaker for the session on Mathematical Physics*
- [Quantissima in the Serenissima III](#), Venice (IT)
- [Many-body theory, effective equations & PDE's](#), Mittag-Leffler Institute Stockholm (SE)
- [Spectral problems in mathematical physics](#), Institut Henri Poincaré, Paris (FR)
- [Seminar at LPMMC](#), Grenoble (FR)
- 2018 - [Meeting of the Italian Association in Mathematical Physics \(GNFM\)](#), Montecatini (IT) (contributed talk)
- [Many-Body Quantum Mechanics](#), Montreal (CA)
- [International Conference on Mathematical Physics \(ICMP18\)](#), Montreal (CA) *invited speaker for the session Equilibrium Statistical Mechanics*
- 2017 - [Mathematical Questions and Challenges in Quantum Electrodynamics and its Applications](#), Oberwolfach (DE)
- [Quantissima in the Serenissima II](#), Venice (IT)
- [INDAM-MSRI Summer School: Non linear dispersive PDE, quantum many particle systems and the world between](#), Cortona (IT)
- [Trieste Quantum Days 2017](#), Trieste (IT)

- 2016 - Sapienza, University of Rome (IT), seminar
 - [Contemporary Trends in the Math. of Quantum Mechanics](#), Rome (IT)
 - SISSA, Trieste (IT) - seminar
 - GSSI, L'Aquila (IT) - seminar
- 2015 - [Renormalization in Statistical Physics and Lattice Field Theories](#), Montpellier (FR)
 - [Trials in Quantum Mechanics and Surroundings 2015](#), Como (IT)
 - LMU, Munich (DE) - seminar
- 2014 - [Mathematical Physics, Analysis and Stochastics](#), Heidelberg (DE) (contributed talk)
 - [Many-Body Quantum Systems](#), Warwick (UK)
 - 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)

GRADUATE CLASSES

- 2017 Lecture “From the quantum many particle system to the nonlinear Schrödinger equation”, INDAM-MSRI graduate school on *Nonlinear dispersive PDE, quantum many particle systems and the world between*, Cortona (IT)
- 2016 Short class on “Gross-Pitaevskii equation from Quantum Dynamics”
Sapienza, Università di Roma (IT)
- 2015 Short class on “Quantum Fluctuations around the Gross-Pitaevskii Dynamics”
University of Stuttgart (DE)

SELECTED INVITATIONS

VISITING PERIODS

- 2019 Hausdorff Center for Mathematics, Bonn (DE), 1 month
 program *Junior Trimester Program on Kinetic Theory* (visit cancelled due to maternity)
- 2019 Mittag-Leffler Institute, Djursholm (SE), 2 weeks
 program *Spectral methods in Mathematical Physics*
- 2018 Isaac Newton Institute, Cambridge (UK), 3 weeks
 program *Scaling limits, rough paths, quantum field theory*

 CRM Montreal (CA), 1 week
 program *Mathematical challenges in many-body physics and quantum information*
- 2012 Hausdorff Center for Mathematics, Bonn (DE), 3 weeks
 program *Mathematical challenges of materials science and condensed matter physics: from quantum mechanics through statistical mechanics to nonlinear PDE*

WORKSHOPS

02/2023	Workshop <i>Non-Markovianity in Open Quantum Systems</i> , BIRF (CA)
07/2022	Workshop <i>The Renormalization Group</i> , MFO Oberwolfach (DE)
09/2019	Workshop <i>Many-Body Quantum Systems and Effective Theories</i> , MFO Oberwolfach (DE) (declined, due to maternity leave)
09/2018	Workshop <i>Many-Body Quantum Mechanics</i> , Montreal (CA)
09/2017	Workshop <i>Mathematical Questions and Challenges in Quantum Electrodynamics and its Applications</i> , MFO Oberwolfach (DE)
09/2016	Workshop <i>Many-Body Quantum Systems and Effective Theories</i> , MFO Oberwolfach (DE)
05/2016	Workshop <i>The Renormalization Group</i> , MFO Oberwolfach (DE)
02/2013	Workshop <i>Equilibrium statistical mechanics</i> , CIRM Marsiglia (FR)
03/2011	Workshop <i>The Renormalization Group</i> , MFO Oberwolfach (DE)

ACADEMIC SERVICES

EDITORIAL RESPONSABILITIES

- Associate Editor for the journal *Mathematical Physics, Analysis and Geometry*, since 2021.
- Referee for: *Annales Henri Poincaré*, *Communications in Mathematical Physics*, *Journal of Statistical Physics*, *Pure and Applied Functional Analysis*, *Review in Mathematical Physics*, *Springer proceedings series*.

ACADEMIC SERVICES AT GSSI

- Part of the Governing Board of the *Doctoral Program in Mathematics in Natural, Social and Life Sciences* at Gran Sasso Science Institute, since May 2020.
- Co-organizer of the SMAQ seminar series, within the research group *Stochastic Modeling in Physics, Biology and Population Dynamics*, involving researchers at the University of L'Aquila and at the Gran Sasso Science Institute.
- Member of the committees for the following Ph.D. defences: Alessandro Montino (GSSI, cycle 29), Michele D'Amico (GSSI, cycle 29), Zhelyazov Delyan Atanasov (GSSI, cycle 30), Anna Paola Todino (GSSI, cycle 31), Fabio Tedone (GSSI, cycle 32)

ACADEMIC SERVICES OUTSIDE GSSI

- External referee for the Ph.D. thesis by:
 - Simone Rademacher (University of Zurich, May 2019)
 - Lea Bossman (University of Tuebingen, October 2019)
 - Severin Schraven (University of Zurich, October 2021)
- Member of the committees of the Ph.D. defence by:
 - Amirali Hannani (Paris Dauphine University, December 2021)

ORGANIZATION OF CONFERENCES, WORKSHOPS, SCHOOLS

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

- [Trials in Wave Turbulence: from random waves to kinetic equations](#)
GSSI L'Aquila (IT) - September 5-10, 2022
- [Statistical and Quantum Mechanics: reconsidering their foundations in the light of new cutting edge experiments and theoretical models](#),
GSSI L'Aquila (IT) - September 20-24, 2021
- [Gran Sasso Quantum Meetings: from equilibrium phenomena to open quantum systems](#),
GSSI L'Aquila (IT) - March 22-26, 2021
- [Mathematical Methods in Field Theory and Quantum Mechanics](#)
SISSA-GSSI joint online lectures - June 23- July 10, 2020
- [Effective equations: frontiers in classical and quantum systems](#)
Hausdorff research Institute for Mathematics, Bonn (DE) - June 24-28, 2019
- [Journeys of women in Mathematics, in honor to Maryam Mirzakhani](#),
University of L'Aquila (IT) - May 9, 2019
- [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

OUTREACH ACTIVITIES

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| Jun. 2021 | Co-organizer of “Indovina chi viene a cena? Aperitivo con le matematiche” , event addressed to high school students (age 17-18) on the occasion of the initiative “May12, Celebrating Women in Mathematics” |
| Oct. 2020 | Co-organizer of a series of online lectures for high school teachers: “Le Meccaniche: considerazione e proposte per la didattica delle leggi di evoluzione dei sistemi fisici.” |
| May 2020 | Co-organizer of the event for bachelor and master students: “Journeys of women in Mathematics in honor to Maryam Mirzakhani. Stop-Over in L'Aquila.” on the occasion of the initiative “May12, Celebrating Women in Mathematics” |
| Feb. 2020 | Popularization talk for high school students (age 16-18):
<i>Cinque W e una matematica.</i> |
| May 2019 | Educational lectures for medium and high school students (age 13-18) on the occasion on the poster exhibition on M. Mirzakhani held at GSSI. |
| Sep. 2018 | One lecture for elementary school students (age 10):
<i>Freddo, freddissimo, ultra freddo: la matematica dei super materiali.</i> |

TEACHING

Ph.D courses held at the GSSI, L'Aquila

- 2022 An introduction to Quantum Mechanics
- 2021 An invitation to Quantum Statistical Mechanics
- 2020 Mathematical problems in Quantum Mechanics
- 2018 Statical and dynamical properties of interacting bosons in the Gross-Pitaevskii regime
- 2017 Derivation of effective equations for many body quantum systems

Teaching Assistant at the Insitute for Mathematics, University of Zurich:

- 2015 Analysis 3 (ODEs and measure theory) - *2nd year class*
- 2014 Thomas–Fermi and Hartree–Fock theory for atoms and molecules - *Master and Ph.D. class*

Teaching Assistant at the University Campus Biomedico, Rome:

- 2011–2012 Physics 1 (Mechanics, Thermodynamics, Electromagnetism and Optics) - *1st year class*
- 2010–2012 Mechanics and Thermodynamics - *1st year class*

MEMBERSHIP OF MATHEMATICAL ASSOCIATIONS

- 2019 – to date European Mathematical Society (EMS)
- 2019 – to date Unione Matematica Italiana (UMI)
Union of Italian Mathematicians
- 2012 – to date International Association of Mathematical Physics (IAMP)
- 2010 – to date Gruppo Nazionale Fisica Matematica (GNFM)
Italian National Group of Mathematical Physics

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