Giulio Giuseppe Giusteri, PhD

Contact information
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Summary

— Over eight years of research in Mathematics and Physics
— Over six years of graduate and undergraduate teaching
— Worked and developed collaborations in three continents
— Interests: Applied mathematics, Complex fluids, Nonlinear analysis, Thin elastic structures, Data-driven modeling, Quantum dynamics on networks, Mathematical physics

Education

2012 **PhD in Pure and Applied Mathematics** at **Università degli studi di Milano-Bicocca**

Thesis: *Higher-gradient theories for fluids and concentrated effects*. Advisor: Alfredo Marzocchi

— Developed the mathematical theory of second-gradient linear isotropic liquids
— Proved well-posedness of fluid-structure interaction problems involving one-dimensional immersed bodies
— Showed how higher-gradient models can capture concentrated effects ignored by classical models

2009 **Master's degree in Physics** *cum laude*
at Facoltà di Scienze Matematiche, Fisiche e Naturali - **Università Cattolica del Sacro Cuore**, Brescia, Italy

2007 **Master's degree in Mathematics** *cum laude*
at Facoltà di Scienze Matematiche, Fisiche e Naturali - **Università Cattolica del Sacro Cuore**, Brescia, Italy

2006 **Bachelor's degree in Physics** *cum laude*
at Facoltà di Scienze Matematiche, Fisiche e Naturali - **Università Cattolica del Sacro Cuore**, Brescia, Italy

Professional Experience

2015–2017 **Postdoctoral Researcher** at the Mathematics, Mechanics, and Materials Unit (formerly Mathematical Soft Matter Unit), **Okinawa Institute of Science and Technology**, Japan

— Studied properties of flexible frames spanned by liquid films and their mathematical description
— Assessed the limit of validity of common approximations in models of quantum evolution
— Developed a new framework for the data-driven modeling of complex fluids
— Developed simulation code in Fortran, C++, and Python
— Served as Representative in the Faculty Assembly for the diverse community of OIST Researchers
— Organized an International Workshop and Contributed to OIST outreach activities

2012–2017 **Researcher** (RTD-A L. 240/2010, *on leave since September 2015*) at the Department of Mathematics and Physics "Niccolò Tartaglia", **Università Cattolica del Sacro Cuore**, Brescia, Italy

— Applied higher-gradient fluids to the study of sedimentation of slender bodies in viscous fluids
— Studied quantum transport in networks modeling natural light-harvesting complexes
— Contributed to outreach activities such as Open Campus and Math Contest for high schools

2014, 1 mo. **Visiting Researcher** at the Mathematical Soft Matter Unit, **Okinawa Institute of Science and Technology Graduate University**, Japan

2012, 6 mos. **Visiting Lecturer (with research duties)** at the Department of Mechanical Engineering, **University of Washington**, Seattle, United States

— Developed a slender-body theory for the interaction between filaments and higher-gradient fluids

2009–2015 **Adjunct Professor** at the Department of Mathematics and Physics "Niccolò Tartaglia", **Università Cattolica del Sacro Cuore**, Brescia, Italy

— Developed courses in Fluid Mechanics, Stochastic Processes, and Mathematics Education Lab
— Supervised 12 undergraduate and 7 graduate students in both Mathematics and Physics
— Served on several Evaluation Committees for Bachelor's and Master's degrees

Teaching and Mentoring

School of Mathematical, Physical, and Natural Sciences - Università Cattolica del Sacro Cuore

2009–2015 *Instructor for* **Fluid Mechanics** (∼10 students per year)
— Renewed and developed part of the course
— Worked with a diverse body of undergraduates in Physics and graduates in Applied Mathematics
— Supervised several Bachelor's theses and one Master's thesis

2011–2015 *Instructor for* **Stochastic Processes** (∼10 students per year)
— Designed a fully new course to complete the graduate program in Applied Mathematics
— Worked with graduate students in Physics and Applied Mathematics
— Supervised five Master's theses on topics related to the course

2013–2015 *Instructor for* **Mathematics Education Lab** (∼100 attendees per year)
— Devised practical activities to introduce geometric topology and group theory to younger students
— Worked with teachers of the secondary school within a certified training program
— Supervised the development by the attendees of similar activities

2012–2015 *Teaching Assistant for* **Rational Mechanics** (Undergraduate course, ∼40 students per year)

2010–2012 *Teaching Assistant for* **Galois Theory** (Graduate course, ∼10 students per year)

2008–2009 *Teaching Assistant for* **Mathematical Models and Methods for Applications** (Undergraduate course, ∼10 students)

School of Engineering - Università degi Studi di Brescia

2009–2010 *Teaching Assistant for* **Statistics and Calculus** (Undergraduate course, ∼80 students)

Secondary School "Istituto Cesare Arici"

2007–2009 *Teacher of* **Science**

Mentoring experience

2010–2015 **Undergraduate students.** Supervised and co-supervised a total of **twelve Bachelor's theses** on topics related to Quantum Transport, Fluid Mechanics, and Dynamical Systems

2012–2016 **Graduate students.** Eight Master's theses supervised:
— Three on financial applications of stochastic differential equations: Dario Fontana (PhD in Economics, Applied Mathematics and Operational Research, University of Bergamo), Annalisa Bonetti (Business Analyst at Prima.it), Elisabetta Benzi (Quantitative Analyst at Banco Popolare)
— Gradient-flow formulation of the Fokker-Planck equation and its applications: Giada Ronchi
— Motion of deformable bodies in viscous fluids: Filippo Recrosi (PhD student at GSSI, L'Aquila)
— Remodeling of poroelastic continua: Simone D'Arco (OCS SpA, Brescia)
— Cooperative phenomena in open quantum systems: Filippo Recrosi (PhD student at GSSI, L'Aquila)
— Stokesian dynamics for extensional rheology: Antonio Martiniello

Grants and Awards

2017 Obtained the Italian **National Scientific Habilitation** for the role equivalent to *Associate Professor*

2016 Contributed to **proposal design and writing** for the competitive internal funding program *OIST Mini Symposia 2016*. Principal Organizer: Eliot Fried (¥ 3,500,000)

2013 Contributed to **research design** and **proposal writing** for the call *Università Cattolica del Sacro Cuore Competitive Funding for Research Projects 2013*. Principal Inverstigator: Alessandro Musesti (€ 65,000)

2013 **Travel grant** from *GNFM-INDAM Young Researchers Projects 2013* (€ 2,000)

2008 Master's degree **thesis award** from the foundation *Ateneo di Brescia*

Scientific Publications

17. G. G. Giusteri, R. Seto. A theoretical framework for steady-state rheometry in generic flow conditions, *Submitted preprint:* http://arxiv.org/abs/1702.02745

16. G. G. Giusteri, E. Fried. Importance and effectiveness of representing the shapes of Cosserat rods and framed curves as paths in the special Euclidean algebra, *J. Elast.*, (2017), doi:10.1007/s10659-017-9656-z

15. R. Seto, G. G. Giusteri, A. Martiniello. Microstructure and thickening of dense suspensions under extensional and shear flows, *J. Fluid Mech.*, 825 (2017), R3
★ *Featured in* **Focus on Fluids** *with an article by H. Wilson. J. Fluid Mech.*, 836 (2018), doi:10.1017/jfm.2017.744 ★

14. G. G. Giusteri, F. Recrosi, G. Schaller, G. L. Celardo. Interplay of different environments in open quantum systems: Breakdown of the additive approximation, *Phys. Rev. E*, 96(1) (2017), 012113

13. G. G. Giusteri, P. Podio-Guidugli, E. Fried. Continuum balances from extended Hamiltonian dynamics, *J. Chem. Phys.*, 146 (2017), 224102

12. G. G. Giusteri, L. Lussardi, E. Fried. Solution of the Kirchhoff–Plateau problem, *J. Nonlinear Sci.*, 27(3) (2017), 1043–1063

11. G. Schaller, G. G. Giusteri, G. L. Celardo. Collective couplings: Rectification and super-transmittance, *Phys. Rev. E*, 94(3) (2016), 032135

10. G. G. Giusteri, P. Franceschini, E. Fried. Instability paths in the Kirchhoff–Plateau problem, *J. Nonlinear Sci.*, 26(4) (2016), 1097–1132

9. G. G. Giusteri, F. Borgonovi, G. L. Celardo. Optimal efficiency of quantum transport in a disordered trimer, *Phys. Rev. E*, 93(3) (2016), 032136

8. G. G. Giusteri, F. Mattiotti, G. L. Celardo. Non-Hermitian Hamiltonian approach to quantum transport in disordered networks with sinks: Validity and effectiveness, *Phys. Rev. B*, 91(9) (2015), 094301

7. G. G. Giusteri, A. Marzocchi, A. Musesti. Steady free fall of one-dimensional bodies in a hyperviscous fluid at low Reynolds number, *Evol. Equat. Control Theory*, 3(3) (2014), 429–445

6. G. G. Giusteri, A. Marzocchi, A. Musesti. Nonlinear free fall of one-dimensional rigid bodies in hyperviscous fluids, *Discrete Contin. Dyn. Syst. Ser. B*, 19(7) (2014), 2145–2157

5. G. L. Celardo, G. G. Giusteri, F. Borgonovi. Cooperative robustness to static disorder: Superradiance and localization in a nanoscale ring to model light-harvesting systems found in nature, *Phys. Rev. B*, 90(7) (2014), 075113

4. G. G. Giusteri, E. Fried. Slender-body theory for viscous flow via dimensional reduction and hyperviscous regularization, *Meccanica*, 49(9) (2014), 2153–2167

3. G. G. Giusteri. The multiple nature of concentrated interactions in second-gradient dissipative liquids, *Z. Angew. Math. Phys. ZAMP*, 64(2) (2013), 371–380

2. G. G. Giusteri, A. Marzocchi, A. Musesti. Nonsimple isotropic incompressible linear fluids surrounding one-dimensional structures, *Acta Mech.*, 217(3-4) (2011), 191–204

1. G. G. Giusteri, A. Marzocchi, A. Musesti. Three-dimensional nonsimple viscous liquids dragged by one-dimensional immersed bodies, *Mech. Res. Commun.*, 37(7) (2010), 642–646

Proceedings

- A. Musesti, G. G. Giusteri, A. Marzocchi. Predicting Ageing: On the Mathematical Modelization of Ageing Muscle Tissue, in G. Riva et al. (Eds.), *Active Ageing and Healthy Living*, Chapter 17

- G. L. Celardo, A. Biella, G. G. Giusteri, F. Mattiotti, Y. Zhang, L. Kaplan. Superradiance, disorder, and the non-Hermitian Hamiltonian in open quantum systems, *AIP Conf. Proc.*, 1619 (2014), 64–72

Invited presentations

- Dec 8, **2017** - *Rheometric and modeling frameworks for complex fluids*, during the MIMS workshop on Modeling and Numerical Analysis of Nonlinear Phenomena (Tokyo)
- Nov 23, **2017** - *Rheological models for complex materials*, during the workshop Recent Advances in Mechanics and Mathematics of Materials (Rome)
- Apr 14, **2017** - *Mathematical modeling and characterization of non-Newtonian viscous fluids*, Nonlinear Analysis Seminar, Kanazawa University
- Jan 13, **2017** - *Paths in the special Euclidean algebra and rod shapes*, at NCTS (Taipei)
- Oct 15, **2016** - *The shapes of a rod are traced in a Lie algebra*, during the workshop Geometry and Materials Sciences (Okinawa)
- May 23, **2016** - *Instability paths in the Kirchhoff–Plateau problem*, at EPFL (Lausanne)
- May 23, **2014** - *Modeling the sedimentation of filaments in viscous fluids via dimensional reduction and hyperviscous regularization*, at Okinawa Institute of Science and Technology (Okinawa)
- Mar 20, **2014** - *Modeling the sedimentation of filaments in viscous fluids with a second-gradient dissipation functional*, during EUROMECH Colloquium 563 (Cisterna di Latina)
- Feb 26, **2013** - *Concentrated interactions in second-gradient dissipative liquids*, at the international research center M&MoCS (Cisterna di Latina)

Contributed presentations

- Jul 1, **2015** - *Optimal energy transfer in disordered quantum networks*, during QuEBS 2015 (Florence)
- Sept 4, **2014** - *Modeling the morphogenesis of brain cortex*, during CIME–CIRM course on Mathematical Models and Methods for Living Systems (Levico Terme)
- May 23, **2013** - *LHI-RC complexes of Rhodobacter Sphaeroides: Superradiance, high efficiency, and adaptability*, during the workshop Transport in Open Quantum Systems (Porquerolles)
- Apr 6, **2013** - *Hyperviscous regularization of the Navier-Stokes equation and the motion of slender swimmers*, during the IV International Conference on New Trends in Fluid and Solid Models (Vietri sul Mare)
- Oct 5, **2012** - *Slender-body theory for viscous flow via dimensional reduction and hyperviscous regularization*, during the annual meeting of GNFM (Montecatini)
- Sept 22, **2011** - *Non-simple liquids dragged by 1D structures*, during GNFM summer school (Ravello)
- Jun 1, **2011** - *A variational approach to the p-Laplace equation on metric measure spaces*, during HCDTE (Trieste)
- Sept 2, **2010** - *Non-simple linear fluids surrounding 1D structures*, during STAMM 2010 (Berlin)
- Sept 24, **2009** - *Quantum computation by polarized excitons*, during GNFM summer school (Ravello)

Organization and Service

2017	**Organizer** of the workshop *Viscoelasticity and Dissipative Dynamics of Rods and Membranes*
2016	Postdoctoral Researchers' **representative** in the OIST Faculty Assembly
2016	Grant Writing **Peer Support Group** for OIST researchers
2015–2016	OIST **Open Campus** and **Science Festival**
since 2011	**Peer reviewer** activity certified on my Publons profile. Reviewer for Mathematical Reviews
2009–2015	**Evaluation Committee** for approximately a hundred Bachelor's and Master's degrees
2009–2015	**Organizing Committee** of *Disfida Matematica*, a math contest for high-school students

Memberships

since 2010	*National Group for Mathematical Physics* of Istituto Nazionale di Alta Matematica "F. Severi" (Italy)
since 2013	International Research Center for Mathematics & Mechanics of Complex Systems (M&MoCS)
since 2014	Group *Dynamics and non-equilibrium states of complex systems: Mathematical methods and physical concepts* of Istituto Nazionale di Fisica Nucleare (Italy)

Professional Development

2016 *Communicating Effectively in English: Building Linguistic and Cultural Strategies for Scientists.* Certified Course

2016 *Introduction to Project Management.* Certified Course

Attended Scientific Workshops, Schools, and Courses

Jan 14–15, 2017	Workshop: Analysis and Partial differential equations (NTU, Taipei)
Oct 15–17, 2016	Workshop: Geometry and Materials Sciences (OIST, Okinawa)
May 23–26, 2016	Workshop: Marrying continuum and molecular physics: the Andersen-Parrinello-Rahman method revised into a scale bridging device (CECAM, Lausanne)
Jan 13–15, 2016	Workshop: Mathematical Modeling and Analysis of Protein Cages (OIST, Okinawa)
Jun 29–Jul 2, 2015	Workshop: Quantum Effects in Biological System 2015 (Florence)
May 25–29, 2015	School: Interaction of Microscopic Stryctures and Organisms with Fluid Flows (Udine)
Sept 1–5, 2014	CIME–CIRM course on Mathematical Models and Methods for Living Systems (Levico)
Feb 3–5, 2014	Course: Thin Elastic Structures (Brescia)
Mar 16–21, 2014	Workshop: EUROMECH Colloquium 563 (Cisterna di Latina)
Sept 29–Oct 4, 2013	Workshop: Evolution Problems for Material Defects: Dislocations, Plasticity, and Fracture (SISSA, Trieste)
May 21–25, 2013	Workshop: Transport in Open Quantum Systems: Experiment and Theory (Porquerolles)
Apr 4–6, 2013	IV International Conference on New Trends in Fluid and Solid Models (Vietri sul Mare)
Oct 22–24, 2012	SNP Workshop 2012: New Materials and New Problems in Continuum Mechanics (Udine)
May 14–18, 2012	BIRS Workshop: Connections Between Regularized and Large-Eddy Simulation Methods for Turbulence (Banff)
Apr 19–20, 2012	Workshop: New concepts on active materials and actuators and bioinspired sensing-actuation control (Seattle)
Sept 19–30, 2011	XXXVI GNFM Summer School on Mathematical Physics (Ravello)
May 30–Jun 3, 2011	HCDTE courses: Variational approach to the Euler equation (A. Figalli), Optimal transportation on manifolds (K.-T. Sturm), at SISSA (Trieste)
Feb 14–19, 2011	School and Workshop on Mathematical Methods in Quantum Mechanics (Bressanone)
Jan 31–Feb 2, 2011	Course: Mathematical Models in Cardiac Physiology (Brescia)
Sept 6–11, 2010	CIME-EMS Summer School in Applied Mathematics: Topics in mathematical fluid-mechanics (Cetraro)
Aug 30–Sep 2, 2010	Workshop: STAMM 2010 (Berlin-Schmoeckwitz)
Jul 12–16, 2010	School: Variational Models and Methods in Solid and Fluid Mechanics (CISM, Udine)
Sept 14–26, 2009	XXXIV GNFM Summer School on Mathematical Physics (Ravello)

Language Skills

- **Italian**: full professional proficiency (mother tongue)
- **English**: full professional proficiency
- **French**: basic oral proficiency
- **Japanese**: basic oral proficiency

December 13, 2017