

Curriculum Vitae

August 2023

RENZO LUIGI RICCA



Personal Details

Date of birth: January 24, 1960. Place of birth: Casale Monferrato (AL), Italy.
Citizenship: Italian and British. Married to Pia Truc; 2 children: Joël, Jolie.
Office: Department of Mathematics and Applications, University of Milano-Bicocca.
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Education

Ph.D. (Mathematics) (16.07.1994). U. Cambridge (Trinity College). Thesis title: *Geometric and topological aspects of vortex filament motion*. Supervisor: Professor H.K. Moffatt
M.Sci. U. Cambridge (Trinity College). Advisor: Professor H.K. Moffatt
Laurea Degree. Politecnico di Torino. Thesis title: *Study of a vortex filament* (in Italian).
Advisors: Professors M. Germano and M.G. Rasetti

Appointments

2004-to present Professor of Mathematical Physics (2008- Tenured), U. Milano-Bicocca
1998-2003 Senior Research Fellow and Lecturer, University College London
1993-1995 Research Associate, Politecnico di Torino
1992-1997 Research Assistant and Fellow, University College London

Visiting Positions

2023-to date, BJUT Distinguished Guest Professor, Beijing University of Technology.
2016-2022 BJUT Guest Professor, Beijing University of Technology.
2022, 2008 (June), Erasmus Professor, Laboratoire Dieudonné, U. Côte d'Azur, Nice.
2019 (February), Erasmus Professor, Department of Mathematics, U. Crete.
2005-2007, Senior Visitor, DAMTP, U. Cambridge & Visiting Professor U. Milano-Bicocca.
2003-2004 Visiting Professor, University College London.
2002-2003, Visiting Professor, École Normale Supérieure, Paris.
2001 (October-November), JSPS Visiting Fellow, Kyushu University.
2000 EPSRC Senior Research Fellow, Isaac Newton Institute, Cambridge.
1997-1998, Senior Scientist, ISIS, EC-Joint Research Centre, Ispra.
1996, 1997, 2000 Visiting Professor, Department of Mathematics, U. Geneva.
1992 Visiting Post-Doc, Institute for Advanced Study, Princeton.
1991 Research Affiliate, Institute for Theoretical Physics, UC Santa Barbara.
1989-1992 Research Associate, DAMTP, U. Cambridge.

Bibliometric Data and Impact

- ORCID ID: 0000-0002-7304-4042
- Google Scholar: h-index = 24; i10-index = 42; 2577 citations
- SCOPUS (63 items): 1125 citations; h-index: 19
- ISI-Web of Science (61 items): h-index = 19; sum of times cited: 1323

International Recognition and Awards

(i) Awards and Distinctions

- 2023 *WIP-SKCM2 Affiliation Membership*, Hiroshima University, Japan.
2022 *Erasmus Visiting Professorship*, U. Côte d'Azur, France.
2018 *Erasmus Visiting Professorship*, U. Crete, Greece.
2013 *Italian National Scientific Habilitation to Full Professorship*, Sector 01/A4. MIUR, Italian Ministry of Education, Italy.
2009 *Erasmus Visiting Professorship*, U. Nice Sophia-Antipolis, France.
2007-2008 *Lagrange Senior Research Fellowship*, Institute for Scientific Interchange & CRT Foundation, Torino, Italy.
2003-2007 "*Brain Gain*" *Programme Scholarship* ("Incentivazione alla mobilità di studiosi stranieri e italiani residenti all'estero"), MIUR, Italian Ministry of Education, Italy.
2001 *JSPS Invitation Fellowship*, Japan Society for the Promotion of Science, Japan.
1991 *J.T. Knight Prize* (Mathematics). University of Cambridge, UK.
1989-1992 *ASP Scholarship*, Associazione Sviluppo Piemonte, Torino, Italy.

(ii) Scientific Boards and Panels

- 2016-to date Board Member (Mathematical Physics), Scientific Editorial Board, *Nature Scientific Reports*, Nature-Springer.
2016-2019 Member, Scientific Steering Committee, IUTAM Symposium "Vortex Dynamics in Science, Nature and Technology". La Jolla, 2018.
2013-2018 Reviewer, *Zentralblatt MATH* (EMS, Heidelberg Acad. Sci., FIZ Karlsruhe), Berlin, Germany.
2010-2018 Reviewer, Coordination and Support Action, FET-Open Scheme, European Commission, Brussels.

(iii) Entries in Biographical Records

- 2002-2020 *Who's Who in the World*. Marquis Pubs., New York, USA.
2006-2018 *Outstanding Scientists of the XXI Century*. Intl. Biogr. Centre, Cambridge, UK.
2004-2018 *Who's Who in Science & Technology*. Marquis Pubs., New York, USA.
2008 *Man of the Year in Science*. American Biographical Institute, Raleigh, NC, USA.

Organization and Direction of International Programmes

(i) Long Term Intensive Research Programmes

- 2019 (September) Scientific Director and Principal Organizer of International "Belt & Road" initiative on *Knotted Fields and Applications*, Beijing University of Technology (BJUT), Beijing & Northwestern University, Xi'an.
2011 (May-July) Scientific Director and Principal Organizer of *Knots and Applications*. Mathematics Research Centre «Ennio De Giorgi», Scuola Normale Superiore, Pisa.
2000 (September-December) Program Organizer of *Geometry and Topology of Fluid Flows*. Isaac Newton Institute for Mathematical Sciences, Cambridge.

(ii) Summer Schools, Workshops and International Conferences

- 2024 (January) Co-Organizer of the GEOTOP-A International Conference on *Applications of Geometry and Topology*. UNAM, Mérida, México.
2022 (September) Principal Organizer of 74th School of Mathematics «Guido Stampacchia» & Intl. Workshop *Topological Methods in Mathematical Physics*. Majorana Foundation and Centre for Scientific Culture, Erice (Sicily).
2021 (January) Chair and Principal Organizer of International B&B "Science-Silk Road" Meeting on *Applications of Geometry and Topology to Topics of Modern Physics*. Online meeting by Tencent's VooV platform.
2019 (September) Chair and Principal Organizer of International Summer School (Beijing), on *Knotted Fields and Applications*. Beijing University of Technology (BJUT), Beijing.

- 2019 (July) Organizer of *SIAM-AG19 Session From algebraic geometry to geometric topology: crossroads on applications*. University of Bern.
- 2016 (April) Chair and Principal Organizer of IUTAM Symposium *Helicity, Structures and Singularity in Fluid and Plasma Dynamics*. Istituto Veneto di Scienze Lettere ed Arti, Venice.
- 2011 (July) Chair and Principal Organizer of Workshop *Topological Dynamics in Physics and Biology*. Ennio De Giorgi Mathematics Research Centre, Scuola Normale Superiore, Pisa.
- 2011 (July) Chair and Principal Organizer of ESF-EMS-ERCOM Conference *Knots and Links: from Form to Function*. Ennio De Giorgi Mathematics Research Centre, Scuola Normale Superiore, Pisa.
- 2011 (May) Chair and Principal Organizer of Pedagogical School *Knots and Links: from Theory to Applications*. Ennio De Giorgi Mathematics Research Centre, Scuola Normale Superiore, Pisa.
- 2001 (June) Scientific Director of CIME Summer School *Topological Fluid Mechanics*. International Mathematical Summer Center, CIME Foundation, UMI, Italy.
- 2000 (October) Organizer of LMS Spitalfields Days *In Search of the Ideal Knot*. Isaac Newton Institute for Mathematical Sciences, Cambridge.
- 2000 (September) Scientific Director of NATO-ASI *Pedagogical Workshop on the Geometry and Topology of Fluid Flows*. Isaac Newton Institute for Mathematical Sciences, Cambridge.
- 1996 (May) Organizer of *UK-MHD Meeting*. University College London.
- (iii) International Activities**
- 2018 (August) Founding and Scientific Committee Member, *GEOTOP-A – Geometry and Topology – Applied*. Web-seminar series: <http://seminargeotop-a.com>
- 2021 (November) Founding Member, *AMR – The Association for Mathematical Research*. <https://amathr.org/>

Invited Lectures at International Conferences and Meetings

(i) Keynote Lectures

- 2023 (April) On Quantum Vortex Knots and Links. *Quantum Topology*. U. Illinois at Chicago.
- 2023 (March) The beautiful interplay of topology and physics. *KickOff Symposium*. SKCM2 Premier World Institute. Hiroshima University.
- 2022 (September) Multi-valued potentials and physical reality. International Workshop on *Topological Methods in Mathematical Physics*. Majorana Foundation, Erice.
- 2021 (October) Minimal unlinking pathways as geodesics in knot polynomial space. Online meeting on *Helicity and space-time symmetry – a new perspective of classical and quantum systems*. Advanced Mathematical Institute (OCAMI), Osaka.
- 2021 (January) Vortex reconnection in classical and quantum systems. Online meeting on *Applications of Geometry and Topology to Topics of Modern Physics*. BJUT & Bicocca.
- 2020 (September) Recent developments in topological field theory. IC-MSQUARE Zoom Conf. on *Mathematical Modeling in Physical Sciences*. Tinos Island.
- 2020 (August) Topological cascade through vortex reconnection. Zoom Conference on *Physical Knotting, Vortices and Surgery in Nature*. Novosibirsk.
- 2019 (November) New routes to quantify topological complexity by adapted polynomials. *EUTOPIA Annual Meeting 2019*. San Sebastian.
- 2019 (October) Quantum vortex dynamics by geometric and topological methods. Int. Meeting on *Waves, Coherent Structures and Turbulence*. University of East Anglia, Norwich.
- 2019 (September) Progress in topological quantum vortex dynamics. Workshop on *Frontier Problems of Theoretical Physics*. Northwestern U., Xi'an.

- 2019 (September) Defect production by phase twist injection as Aharonov-Bohm effects. Intl. Conference *Knotted Fields and Applications*. BJUT, Beijing.
- 2019 (July) Momentum of vortex tangles by weighted area information. SIAM-AG19 Session *From algebraic geometry to geometric topology: crossroads on applications*. U. Bern.
- 2019 (June) Minimal unlinking pathways as geodesics in polynomial space. *BAGEL19 Workshop*. Institute for Mathematics and its Applications. Minneapolis.
- 2018 (November) Writhe and twist helicity in quantum vortex systems. Int. Workshop. on *From many Particle Systems to Quantum Fluids*. Gran Sasso Science Institute, L'Aquila.
- 2018 (November) Geometric devils in topological dynamics. *GEOTOP-A* international web-seminar. GEOTOP-A Channel: <http://seminargeotop-a.com>
- 2018 (January) Quantum vortex dynamics by signed area information. Int. Conf. *Phonon Hydrodynamics in Solid and Superfluids*. U. Palermo.
- 2017 (September) Quantum vortex dynamics by Seifert surface information. INI Workshop on *Form and Deformation in Fluid and Solid Mechanics*. Isaac Newton Institute for Mathematical Sciences, Cambridge.
- 2017 (June) Influence of winding number on vortex torus knots dynamics. IUTAM Symposium on *Dynamics and Topology of Vorticity and Vortices*. Carry-le-Rouet.
- 2016 (September) Vortex knots cascade by HOMFLYPT polynomial. Workshop on *Knots and Links in Biological and Soft Matter Systems*. ICTP, Trieste.
- 2016 (July) Knots cascade detected by a monotonically decreasing sequence of HOMFLYPT values. Invited lecture at *Intl. Conf. on Knots, Low Dimensional Topology & Applications - Knots in Hellas 2016*. IOA, Ancient Olympia, Greece.
- 2016 (July) Vortex knots cascade by HOMFLYPT polynomial. Invited lecture at *XI AIMS Int. Conf. Dynamical Systems, Diff. Equations and Applications – Session on Vortex Dynamics*. Orlando, FL.
- 2016 (June) Vortex knots cascade by HOMFLYPT polynomial. *EUROMECH Colloquium 581*, Institute of Thermophysics, SB RAS, Novosibirsk, Russia.
- 2015 (September) Geometric daemons in topological dynamics. IMRA Meeting on *Geometry and Biophysics*, Strasbourg, France.
- 2015 (August) HOMFLYPT polynomial for vortex knots and cascade process. Workshop on *Knots in Theory and Science*, Basel, Switzerland.
- 2015 (June) From magnetic helicity to energy-complexity relations for solar loops. IRF-MSB project meeting *Forecast and Warnings of Extreme Storms at the Sun*, Lund, Sweden.
- 2015 (April) From helicity to the HOMFLYPT polynomial of fluid knots and links. Intl. Conference on *Knots and Links in Fluid Flows*, Moscow Independent U., Moscow.
- 2014 (September) Groundstate energy and topological complexity of magnetic knots. Intl. Meeting *Knots in Soft Condensed Matter*, Vienna, Austria.
- 2014 (June) Writhe helicity conservation under anti-parallel reconnection. ESF Workshop *Reconnection Events in Classical, Quantum and Magnetized Fluids*, Glasgow U., UK.
- 2014 (June) From “multiple continuity” to modern topological field theory. Intl. Meeting *Riemann, Topology and Physics*, U. Strasbourg, France.
- 2014 (March) Relaxation of magnetic knots to braids and groundstate energy minima. Int. Conf. *CAKE*, Max Planck Institut Leipzig, Germany.
- 2013 (November) Knot polynomials as new tool for turbulence research. Int. Conf. *Turbulence & Wave Processes*, Lomonosov Moscow State University, Russia.
- 2013 (March) The Jones polynomial as a new invariant of fluid dynamics. IUTAM Symposium *Vortex Dynamics: Formation, Structure and Function*, Fukuoka, Japan.
- 2012 (December) On the energy spectrum of knots and links. *Quantized Flux in Tightly Knotted and Linked Systems*, Cambridge, UK.
- 2012 (October) Topological bounds on the energy and complexity of magnetic fields. *Tangled Magnetic Fields in Astro- and Plasma Physics*, Edinburgh, UK.

- 2012 (September) Tackling fluid tangles complexity by knot polynomials. *Int. Symp. On Complex Systems*, ICNAAM 2012, Kos, Greece.
- 2012 (July) Impulse of vortex knots from diagram projections. IUTAM Symposium *Topological Fluid Dynamics*, Cambridge, UK.
- 2012 (June) Recent progress in topological fluid dynamics: from helicity to Jones polynomials. *Knotted Fields*. Kavli Institute for Theoretical Physics, UC Santa Barbara, USA.
- 2012 (March) Tackling structural complexity in vortex dynamics, Intl. Conf. *Vortices and solitons in classical and quantum fluids*. CIRM, Marseille, France.
- 2011 (September) Energy-complexity relations by structural complexity methods. *Int. Symp. on Complex Systems*, ICNAAM 2011, Halkidiki, Greece.
- 2011 (July) On the groundstate energy spectrum of magnetic knots. ESF-EMS-ERC COM Intl. Conf. *Knots and Links: from Form to Function*. Ennio De Giorgi Mathematics Research Centre, Scuola Normale Superiore, Pisa.
- 2010 (June) Topological dynamics by structural complexity analysis. *Sixth Intl. Conf. on Dynamical Systems and Applications*, Antalya, Turkey.
- 2009 (March) Topology bounds the energy of knots and links. *Edinburgh Mathematical Society Meeting*, Dundee, UK.

(ii) Lectures and Short Courses at International Programmes and Advanced Schools

- 2019 (September) *6 Lectures*. Summer School on *Knotted Fields*. University of Technology.
- 2018 (September) *7 Lectures*. Advanced Master Course on *An Introduction to Topological Fluid Dynamics*. Institute for Theoretical Physics, Beijing University of Technology.
- 2017 (September) *6 Lectures*. GNFM and INdAM *Summer School on Mathematical Physics*. Italian Mathematical Union, Ravello.
- 2017 (June) *3 Lectures*. International Early Summer School on *Contemporary Aspects, Overview and Outlook on Knots*. Freiburg University.
- 2017 (February) *3 Lectures*. School on *Knots and Applications - From the Mathematics of Knots to DNA Topology*. Scuola Normale Superiore, Pisa.
- 2014 (September) *1 Lecture*. Summer School on *Finsler Geometry with Applications*. Samos Island, Greece.
- 2012 (September) *6 Lectures*. IAR School *Fluid Mechanics and Magneto-hydrodynamics*. ITAP, Marmaris, Turkey.
- 2011 (May) *6 Lectures*. Pedagogical School *Knots and Links: From Theory to Applications*. Ennio De Giorgi Mathematics Research Centre, Scuola Normale Superiore, Pisa.
- 2007 (September) *1 Lecture*. Summer School *Meeting Mathematics and Physics*. MatNet & U. Bergamo, San Pellegrino, Italy.
- 2001 (June) *5 Lectures*. CIME Summer School *Topological Fluid Mechanics*. Unione Matematica Italiana, Cetraro, Italy.
- 2000 (June) *3 Lectures*. Summer School *Geometric and Topological Methods in Dynamical Systems*. University of Bourgogne, Dijon, France.
- 1998 (September) *4 Lectures*. EC Summer School *Turbulence and Applications*. Landau Network and EC-JRC Ispra, Centre “A. Volta”, Como, Italy.
- 1996 (May) *4 Lectures*. Summer School *Vortex and Flux Tubes: Observations, Stability, Topology*. Observatoire de la Côte d'Azur, Nice, France.
- 1995 (December) *2 Lectures*. *Workshop Mathematical Methods in Materials Science*. IAC-CNR, Rome, Italy.
- 1995 (May) *3 Lectures*. Workshop *Geometry and Topology in Low Dimensions*. Scuola Normale Superiore and University of Pisa, Italy.

(iii) Contributions to Special International Events

- 2019 (November) GPE defect production by phase twist injection as Aharonov-Bohm effect. *EUTOPIA Annual Meeting 2019*. WG5, San Sebastian.

- 2017 (October) Knot polynomials as a new tool for turbulence research. *FIMA Day*, Consiglio Nazionale delle Ricerche, Rome, Italy.
- 2014 (May) Participation in *Geometrical Aspects of Hydrodynamics* workshop, Simon Center for Geometry and Physics, Stony Brook (NY), USA
- 2012 (September) Public Panel Discussion on Complex Systems. *Int. Symp. On Complex Systems*, ICNAAM 2012, Kos, Greece.
- 2012 (June) Open discussion on Călugăreanu-White-Fuller theorem. Mini-programme *Knotted Fields*. Kavli Institute for Theoretical Physics, UC Santa Barbara, USA.
- 2011 (March) Topology bounds the energy of knots and links. Edinburgh Mathematical Society meeting, Dundee, UK.
- 2005 (April) Magnetic knots and minimal braids. *Turbulence, Twist and Treacle - Meeting in Celebration of 70th Birthday of H.K. Moffatt*. Isaac Newton Institute, Cambridge, UK.
- 2003 (November) Energy-complexity relations for vortex flows. *Colloquium in Honor of J.J. Moreau*, Laboratoire de Méchanique et Genie Civil, U. Montpellier II.
- 2000 (May) From Kelvin vortex knots to turbulence. *IMA World Mathematical Year Millennium Event*. The Institute of Mathematics and Its Applications, London.

(iv) Other Invitations to International Conferences and Meetings

- 2011 (June) Topological dynamics by structural complexity methods. Workshop *Topology in Fluid Flow Visualization*. Ennio De Giorgi Mathematical Research Centre, Scuola Normale Superiore, Pisa.
- 2011 (May) From Gauss' derivation of linking number to its rôle in modern topological dynamics. Workshop *Entanglement and Linking*. Ennio De Giorgi Mathematical Research Centre, Scuola Normale Superiore, Pisa.
- 2010 (May) New lower bounds on the energy of knots and braids. *Eighth AIMS Conference on Dynamical Systems, Differential Equations and Applications*, Special Session on "Magnetohydrodynamics: Mathematical Problems and Astrophysical Applications", Dresden, Germany.
- 2010 (May) Vortex dynamics estimates by structural complexity analysis. *Eighth AIMS Conference on Dynamical Systems, Differential Equations and Applications*, Special Session on "New Trends in Mathematical Fluid Dynamics", Dresden, Germany.
- 2009 (May) Topology bounds the energy of knots and links. Intl. Conf. *Knots and Applications*, ICTP, Trieste, Italy.
- 2008 (September) On the groundstate energy of knotted magnetic flux tubes. *EURO MHD 2008*. Nice, France.
- 2008 (May) Detecting structural complexity: from visiometrics to genomics and brain research. *MathKnow08*. Politecnico di Milano, Italy.
- 2008 (April) From Da Rios' equations to integrable vortex dynamics. *II Workshop on Nonlinearity & Geometry: Darboux Days*. Bedlewo, Poland.
- 2006 (March) Twist and fold modeling of supercoiled filaments. *Knots and Macromolecules*. Istituto Veneto di Scienze, Lettere ed Arti, Venice, Italy.
- 2005 (September) Measures of structural complexity for vortex flows. *Singularities, coherent structures and their role in intermittent turbulence*. Department of Mathematics, University of Warwick, UK.
- 2005 (June) From vortex rings, to knots and links. *Vortex Rings and Filaments in Classical and Quantum Systems*. International Center Theoretical Physics, Trieste, Italy.
- 2002 (July) On Kelvin's vortex knots. Workshop *Geometry, Symmetry and Mechanics*. Department of Mathematics, University of Warwick, UK.
- 2001 (December) In search of symmetries in magnetic knots. Symposium *Geometric Mechanics and Symmetry*. Department of Mathematics, University of Warwick, UK.
- 2001 (January) From fluid knots to complex systems. *Knots in Science*. MAA-AMS Joint Mathematics Meetings, New Orleans, USA.

- 2000 (November) Asymptotic potential theory for slender tubes, intrinsic kinematics and minimal surfaces. *BRIMS Day*. Isaac Newton Institute for Mathematical Sciences, Cambridge, UK.
- 2000 (October) A history of Kelvin's vortex knots. *Spitalfields Day*. Isaac Newton Institute for Mathematical Sciences, Cambridge, UK.
- 1998 (August) Topological ideas in vortex dynamics. Conference *Knots in Hellas '98*. Delphi, Greece.
- 1997 (June) Inflexional disequilibrium of elastic and magnetic knots. Workshop *Mathematics and Mechanics for Materials Science and Molecular Biology*. Capri, Italy.
- 1995 (August) New developments in topological fluid mechanics. Conference *Knot Theory and Applications*. Stefan Banach International Mathematical Centre, Warsaw, Poland.
- 1994 (May) The Calugareanu invariant in topological fluid mechanics. Conference *Romania and Romanians in Contemporary Science*. Sinaia, Romania.
- 1990 (June) Invariants of the Da Rios-Betchov equations. Symposium *Generation of Large-Scale Structures in Continuous Media*. Perm, Soviet Union.

Regular Contributions to Meetings

(i) Lectures and Oral Contributions at International Conferences

- 2022 (May) Vortex dynamics by geometric and topological methods. *IQM22*, Politecnico di Milano.
- 2021 (August) Twist effects of quantum vortex defect. *Dynamics Days XV*. U. de la Côte d'Azur Nice.
- 2009 (August) Topology bounds the energy of knots and links. *XVI ICMP*. Prague, Check Republic.
- 2007 (July) A new Stretch-Twist-Fold model for fast dynamo. *ICIAM '07*. Zürich, Switzerland.
- 2006 (January) Twist and fold modeling for DNA supercoiling. I FIMA Int. Conf. *Models and Methods for Human Genomics*. Champoluc-Ayas, Italy.
- 2005 (August) Linear and angular momentum of a vortex tangle. *High Reynolds Number Vortex Interactions*. Toulouse, France.
- 2003 (June) Energy-complexity relations for vortex flows. *Fluxes and Structures in Fluids*. Saint Petersburg, Russia.
- 2002 (July) Measuring structural complexity of fluid flows. *Fundamentals of Vortices, Convection and Turbulence in Rotating Flows*. Dpt. Mech. Eng., University College London.
- 2000 (August) Relaxation of magnetic knots. *XVI IMACS World Congress*. Lausanne, Switzerland.

(ii) Science outreach

- 2017 (February) Knots and Applications. *La Matematica nel Mondo Contemporaneo*. Accademia dei Lincei e Scuola Normale Superiore, Pisa, Italy.
- 2012 (October) From the theory of knots to the topology of chaos. *I Mercoledì della Scienza*. Fondazione di Piacenza e Vigevano, Piacenza, Italy.
- 2007 (October) Detecting structural complexity by computational fluid dynamics. Round Table *CAPI 2007*. CILEA, Politecnico di Milano.
- 2006 (February) Modern developments in mathematical biology. *Mathematical Modeling and Systems Biology*. Canavese Bio-industry Park, Ivrea, Italy.

Fund-Raising and Research-Related Activities

(i) Funded Research Projects

- 2019 Fondo di Ateneo Quota Competitiva (FAQC) *Geometric and Topological Aspects of Knotted Fields and Applications* (Principal Investigator, UniMiB).
- 2016 Natural Science Foundation of China (NSFC) Grant N. 11572005 *Topological Fluid Mechanics* (X. Liu principal investigator, BDIC-BJUT).
- 2010 INdAM-ESF funding for Intensive Research Trimester *Knots and Applications* (Principal Applicant and Organizer, U. Milano-Bicocca).
- 2006-2010 MIUR COFIN 2006-PRIN Project: *Geometric Methods in the Theory of Non-Linear Waves and Applications* (B.A. Dubrovin Principal Investigator, SISSA-Trieste).
- 2004-2006 MIUR COFIN 2004-PRIN Project: *Mathematical Models for DNA Dynamics $M^2 \times D^2$* (G. Gaeta Principal Investigator, U. Milano).
- 2003-2007 MIUR Research Project: *Measures of Complexity and Energy for Fluid Systems* (Principal Investigator, U. Milano-Bicocca).
- 2001-2004 The Royal Society of London, Joint Research Project: *Physical Knots* (Principal Investigator, U. Lausanne).
- 2000 London Math. Society, Collaborative grant: *Vortex Knots in Ideal Fluids* (X. He Principal Investigator, U. Warwick).
- 1998-1999 Swiss National Science Foundation, Project: *Knot Theory and Applied Topology* (C. Weber Principal Investigator, U. Geneva).
- 1998 PPARC, Project: *The Energy and Topology of Coronal Magnetic Fields* (M.A. Berger Principal Investigator, UCL).
- 1997 UK-USA NSF, Project: *Topology in Heliosphere* (A. Ruzmaikin Principal Investigator, JPL, Pasadena).
- 1994 The Leverhulme Trust, Project: *Energetic and Topological Aspects of Magnetic Field Structures* (M.A. Berger Principal Investigator, UCL).
- 1994 PPARC, Project: *The Structure and Energy of Coronal Magnetic Fields* (M.A. Berger Principal Investigator, UCL).

(ii) Reviewing and Peer Refereeing

- Reviewing for grant proposals and projects: NSF (USA), EPSRC (UK), EC-FET (EU).
- Reviewing for intl. journals: *Mathematika*, *Zentralblatt MATH*.
- Refereeing for primary journals: *JFM*, *Fluid Dyn. Res.*, *JKTR*, *Phys. Fluids*, *GAFD*, *PRL*, *Proc. R. Soc.*, *Phys. Rev.*, *NonLinearity*, *J. Phys A*, *Phys. Letts.* and many others.
- Refereeing for intl. publishers: Imperial College Press, Springer-Verlag, World Scientific.

Teaching, Examination & University Offices

(i) Doctoral Courses (PhD, III level)

- 2023 (Summer) “Topological Vortex Dynamics”, Cargèse Summer School on Mathematical Fluid Dynamics, Cargèse.
- 2022 (Summer) “An Introduction to Topological Magnetohydrodynamics”, Laboratoire Dieudonné, U. Côte d’Azur.
- 2021 (Winter) “Knotted Fields”, Department of Mathematics and Applications, U. Milano-Bicocca.
- 2018 (Spring) “Classical and Quantum Knots – Theory and Applications”, Department of Mathematics and Applications, U. Milano-Bicocca.
- 2009 (Winter) “An Introduction to Topological Magnetohydrodynamics”, Laboratoire J.A. Dieudonné, U. Nice Sophia Antipolis.
- 2008 (Spring) “Geometric and Topological Vortex Dynamics”, Laboratoire J.A. Dieudonné, U. Nice Sophia Antipolis.

- 2008 (Spring) “Physical Applications of Knot Theory”, Department of Methods and Models for Mathematics, U. Rome “La Sapienza”.
- 2006 (Spring) “Physical Applications of Knot Theory”, Department of Mathematics, Politecnico di Torino.
- 2005 (Spring) “Elements of Topological Fluid Mechanics”, Department of Mathematics and Applications, U. Milano-Bicocca.
- 2002 (Spring) “An Introduction to Geometric and Topological Magnetohydrodynamics”, Department of Advanced Science and Technology, U. Piemonte Orientale.
- 2001 (Spring) “Seven Lectures on Topological Fluid Mechanics” Research Institute for Mathematical Sciences, Kyoto University (also at Osaka City U., Nagoya U., Tokyo U. and NIFS-Toki).
- 2000 (Spring) “Geometric and Topological Aspects of Fluid Dynamics”, U. Geneva.

(ii) Graduate Courses (MS, II level)

- 2015-to date Mathematical Methods for Modern Physics, U. Milano-Bicocca.
- 2019 From Fluid Knots to Minimal Surfaces, Beijing University of Technology.
- 2019 Erasmus Course: Hydrodynamics of Condensates, U. Crete.
- 2018 An Introduction to Topological Fluid Dynamics, Beijing University of Technology.
- 2009-2011 Applied Mathematics (BioInformatics), U. Milano-Bicocca.
- 2004-2008 Physical Theories and Mathematical Models, U. Milano-Bicocca.
- 2003 Mathematical Methods III (M241), UCL.
- 1994-1998 Mathematical Methods (Hydrogeology), University College London.
- 1995 (April) Geometric Methods in Fluid Mechanics. Scuola Normale Superiore, Pisa.

(iii) Undergraduate Courses (BS, I level)

- 2011-to date Mathematics (Biological Sciences), U. Milano-Bicocca.
- 2008-2011, 2013-2014 Mathematics II (Chemistry), U. Milano-Bicocca.
- 2010-2013 Mathematical Models and Differential Equations, U. Milano-Bicocca.
- 2008-2010 Elements of Mathematics II (Chemistry), U. Milano-Bicocca.
- 2003 Elementary Mathematics (A1A), UCL.
- 2002 Mathematics (B51B, Economics, Statistics), UCL.
- 1997-1998 Mathematics II (A3, Physical Sciences), UCL.
- 1997-1998 Mathematical Methods (B6, Chemistry), UCL.

(iv) Direction and Examination of PhD, MS and BS Projects

- Direction of Ph.D. projects: Francesca Maggioni (2004-2006); Chiara Oberti (2011-2015); Franz Schlöder (2016-2020); Matteo Foresti (2016-2022); Alice Roitberg (2018-2023); Hao Guan (2022-to date); Martina Luise (2022-to date).
- Examination of Ph.D. candidates: A. Xiong (U. Birmingham, 2022) S. Candelaresi (NORDITA, Stockholm U., 2012); J.N. Hartnack (Technical U. Denmark, 1999).
- Supervision of MS and BS projects: more than 60 students to date.

(v) University Offices

Departmental Coordinator, Member of the Internationalization Committee of the University of Milano-Bicocca.

International Referees

- Europe**
- Professor C.F. Barenghi, Dept. Mathematics, U. Newcastle, UK. carlo.barenghi@newcastle.ac.uk
 - Professor H.K. Moffatt, DAMTP, U. Cambridge, Cambridge, UK. hkm2@damtp.cam.ac.uk
 - Professor A. Niemi, Dept. Physics & Astronomy, Uppsala U., Sweden. antti.niemi@me.com
 - Professor D. Ruelle, IHES, Bures-sur-Yvette, France. ruelle@ihes.fr
- USA**
- Professor L.H. Kauffman, Dept. Mathematics, U. Illinois at Chicago, USA. kauffman@uic.edu
 - Professor K.R. Sreenivasan, Courant Institute, New York U., USA. krs3@nyu.edu
 - Professor De W.L. Sumners, Dept. Mathematics, Florida State U., USA. sumners@math.fsu.edu
- Asia**
- Professor T. Kambe, Institute of Dynamical Systems, Tokyo, Japan. kambe@ruby.dti.ne.jp
 - Professor Z.-S. She, State Key Lab. Complex Systems, U. Peking, P.R. China. she@pku.edu.cn