

DANIELA TORDELLA

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ASN - Abilitazione Scientifica Nazionale - Tornata 2012. February 3, 2014. Italian National Scientific Qualifications awarded for Full Professor positions (Abilitazioni Scientifiche Nazionali di I fascia), Academic Field (Settore Concorsuale) 09/A1 Ingegneria Aeronautica, Aerospaziale e Navale, Academic Discipline, SSD, ING/IND-06 Fluid Dynamics

Politecnico di Torino - 2008 Processo di accelerazione di Carriera (Prof. F. Profumo, Rector) _ Upgrade to full professorship.
Selection of the thirty best performing Associate Professors

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EDUCATION AND ACADEMIC RECORD

1983: Von Karman Institute for Fluid Dynamics, M.Sc., Environmental and Applied Fluid Dynamics, 1981: Politecnico di Torino, M.Sc, Aerospace Engineering,

Politecnico di Torino, Settore Concorsuale, 09/A1 Ingegneria Aeronautica, Aerospaziale e Navale, Academic Discipline, SSD, ING/IND-06 Fluid Dynamics: Associate Professor: 2017 - Department of Applied Science and Technology, 1992 - 2017 Department of Ingegneria Meccanica ed Aerospaziale, Assistant Professor: 1989 - 1992 Department of Ingegneria Meccanica ed Aerospaziale

University of Washington, Seattle, US: 1987-89 Research Associate, Department of Aeronautics and Astronautics

Politecnico di Torino: 1984-86 Research Associate, Department of Aerospace Engineering

VISITING POSITIONS

2015-2016 (2 months): Massachusetts Institute of Technology, Kavli Institute for Astrophysics and Space Research MITO program (Dr. J. D. Richardson, Prof. J.W. Belcher)

2013-2014 (1 month): Massachusetts Institute of Technology, Department of Mathematics, MITO Program (Prof. R. Rosales, Prof. G. Staffilani)

2011 (1 month): Kavli Institute for Theoretical Physics, University of California, Santa Barbara (Invited by David Gross (Noble Laureate 2004 and KITP Director) to participate to the 2011 Program "The Nature of Turbulence", Feb 7,2011 -Jun 3,2011.

1992 (2 months): WIAS, Karl Wierstrass Institute für Angewandte Analysis und Stochastik, Berlin

SERVICE ACTIVITIES

INTERNATIONAL ACADEMIC EXCHANGES

Proposal and appointment as Responsible Contact Person

- - Biennium 2007-2008, Cooperation Agreement between the POLITECNICO di TORINO and the POLITECNICO di MILANO for joint research in the field of turbulence dynamics and exchange of faculty and students for study and research. The cooperation program is called Joint Experiments Theory Simulations on Turbulence (JETSOT). Signed by the Rectors F.Profumo and G.Ballio in Milano on May 31, 2006.

- - Proponent of the Cooperation agreement between Università di Torino (Dip.Fisica Generale), Politecnico di Torino (Dip.Ing.Aeronautica e Spaziale) and Osservatorio Astronomico di Torino, signed by L.Ferrero (UniTO),M.Di Sciuva (PoliTO), E.Trussoni (Oss.TO), 15-7-2008.

- - Contact person for the Italian engineering part of the Academic Exchange between CMSO in USA and JETSOT in Italy. The Center for Magnetic Self-Organization in Laboratory and Astrophysical Plasmas (CMSO, established by NSF in september 2003) includes scientists of the University of Wisconsin, the University of Chicago, the Princeton University, the Science International Corporation, the Swarthmore College and the Lawrence Livermore National (S.Prager, R. Rosner). Academic exchange agreement CMSO - JETSOT, signed by S.Prager (CMSO), A.Ferrari (JETSOT). June 2005.

- - Proponent and Contact Person of the General agreement between The University of Washington and the Politecnico di Torino within the framework of Internazionalization Program of the Italian Ministry of University and Research, signed by C.Naldi (PoliTO), K.K.Tung, A.Bruckner (UW). April 2005. Referents: W.O.Criminale and R.E.Breidenthal (UW), D.Tordella (PoliTO).

- - Proponent of the Agreement between the POLITECNICO di TORINO and the UNIVERSITY of DARMSTADT on the exchange of the Spectral Code for Incompressible Navier-Stokes equations, authored by D.Tordella and M.Iovieno. The Politecnico di Torino remains the sole owner of the software, the University Darmstadt is responsible for using the software for research and development purposes only. Reference persons: Prof. D.Tordella, Politecnico di Torino, Prof. M.Oberlack, Technische Universität Darmstadt. Signed February 2007.

EVALUATION COMMITTEES

Professorships

- - 2016 Committee (Member Designated) for Associate Professorship Qualifications, call by the Università di Bergamo, 2016

- - 2015 Committee (Member Designated) for Assistant Professorship Qualifications, call by the Università degli Studi di Napoli Federico II, Dipartimento di Ingegneria Industriale, 2015

- - 2010, Tel Aviv University, Referee for Associate Professorship Qualifications

- - 2005 National Committee (Member Elected) for the Associate Professorship Qualifications call by the Politecnico di Milano, 2005

- - 2003, The Texas University at Austin, Referee for Associate Professorship Qualifications

- - 2001, National Committee (Member Elected) for Associate Professorship Qualifications, call by the Università di Bologna, 2001

- - Committee of the Engineering Faculty of the Politecnico di Torino for tenure track positions of Assistant Professor (1996-2002).

PhD

- - Doctoral Committee, University of Toulouse, candidate Gabriele Nastro, October 30, 2020

- - Doctoral Committee, University of Delft, candidate Melika Gull, October 28, 2019.

- - Doctoral Committee, The University of New Castle, Australia, candidate Kamruzzaman M., July, 2016. - Board of Advisors of the Course of Doctorate in Physics, 2017-2020

- - Board of Advisors of the Course of Doctorate in Aerospace Engineering, Politecnico di Torino 2013-2018

- - Board of Advisors of the Course of Doctorate in Mathematics for the Engineering Sciences of the Politecnico di Torino, 2009-2017

- - Board of Advisors of the Course of Doctorate in Fluid Dynamics, Consortium Politecnico di Torino and Università degli Studi di Torino, 1994-2012

- - Doctoral Committee, Politecnico di Milano, Doctorate in Aerospace Engineering, XX and XXI cycles.

INTERNATIONAL RESEARCH PROPOSAL REFEREEING

- Review of grant proposal for the ISF, the Israel Science Foundation, <https://review.isf.org.il/Login>
- Evaluation of application to research funds for the FWF Austrian Science Fund, Austria <http://www.fwf.ac.at/en/>
- Swiss Federation, State Secretariat for Education and Research, SER, evaluations for the Swiss participation to EU VI and VII Frame Work Programs, http://erawatch.jrc.ec.europa.eu/erawatch/opencms/information/country_pages/ch/organisation/organisation_mig_0007
- EU VII Frame Work Program, COST (European Cooperation in Science and Technology) Actions, http://www.cost.eu/domains_actions
- Exact Sciences & Technology, Israel Science Foundation, 2014. http://www.isf.org.il/english/judge.asp?menu_to_open=review

POLITO LIBRARY SYSTEM

- - Member of Scientific Advisory Board of the Politecnico di Torino Library System of the Politecnico di Torino (Sistema Bibliotecario Politecnico di Torino, HYPERLINK "<http://www.biblio.polito.it/>" <http://www.biblio.polito.it/>), 2006-2013.

INTERNATIONAL CONFERENCES ORGANIZATION

- - 33rd Parallel Computational Fluid Dynamics Conference (ParCFD21), Alba, May 25-27, 2022.
- - ETC17, European Turbulence Conference, Chair-person, Turin, 3-6 Sept. 2019.
- - EUROMECH COLLOQUIUM. Small scale turbulence and related gradient statistics. Results from laboratory and direct numerical simulations. HYPERLINK "<http://www.euomech512.polito.it/>" <http://www.euomech512.polito.it/> European Mechanics Society, October 26-29, 2009, Turin, Accademia delle Scienze accademia. Chairpersons: D. Tordella, Politecnico di Torino and K.R.Sreenivasan, Abdus Salam International Centre for Theoretical Physics, Trieste, Italy.
- - 3rd ICTR Meeting. Organization and Chairpersons D.Tordella and F.Toschi, www.ictr.eu Politecnico di Torino, Turin, October 30-31 2009.
- - Organization of the Workshop on Non-linear and Dissipative Processes in Fluid Dynamics and Astrophysical Plasmas, Politecnico di Torino, Turin, December 9-10, 1999.
- - Organization of the International Conference in Memory of Professor Carlo Ferrari, Politecnico di Torino, Turin, April 3-4 1998.

EDITORIAL ACTIVITY

Referee. - Physical Review Fluids - Journal of Geophysics - Astrophysics and Space Science - New Journal of Physics, - Proceedings of the Royal Society, Series A - Physical Review Letters, - Physical Review E, - Physics of Fluids, - Journal of Computational Physics, - Journal of Fluid Mechanics, - Journal of Turbulence - Physics Letters A, - Journal of Zhejiang University - Science A - Acta Mechanica, - Computer Physics Communication, - Archive of Applied Mechanics, - Quarterly Journal of Mechanics and Applied Mathematics. - Mathematical Models and Methods in Applied Sciences. - International Journal of Multiphase Flows.

Editor - Physica D Nonlinear Phenomena, Elsevier, www.journals.elsevier.com/physica-d-nonlinear-phenomena/ 2010/2012 Special Issue Small Scale Turbulence, Volume 241, Issue 3, Pages 135-314 (1 February 2012), - New Journal of Physics, Institute of Physics, <http://iopscience.iop.org/1367-2630> 2013 - Special Focus on Astrophysical Jets, HYPERLINK "<http://iopscience.iop.org/1367-2630/page/Focus>", Proceedings of the Euomech Colloquium Small Scale turbulence and related gradient statistics (Turin, October 26-29, 2009), Accademia delle Scienze di Torino. 144 pp., ill., b/n 2009 (issued onl 23.10.2009).

MAJOR SCIENTIFIC CONTRIBUTIONS

Contributions in Fluid Mechanics, Computational Science, Space Science and Astrophysics, Warm Cloud Microphysics, Remote Sensing

Fluid Mechanics. Hydrodynamics: multiscale analysis of convective wake instability, hydrodynamic stability of travelling waves in channel flows, dispersion properties of traveling internal waves, dispersive to non dispersive transitions in Couette and channel flows, supercritical cross-flow 3D boundary layers, highly underexpanded jets, hypersonic jets: spreading and asymmetric stability properties of hypersonic jets.

Fluid Mechanics. Turbulence Dynamics: Sufficient condition for Gaussian departure in turbulence, Small-Scale Anisotropy in Turbulent Shearless Mixing, Mixing of a passive scalar across a thin shearless layer, Large-eddy simulation of hypersonic flows. Selective procedure to activate the sub-grid model wherever small scale turbulence is present, Pressure and kinetic energy transport across the cavity mouth in resonating cavities.

Clouds Microphysics and Remote Sensing. Intermittency acceleration of water droplet population dynamics inside the interfacial layer between cloudy and clear air environments, Innovative Mini Ultralight Radioprobes to Track Lagrangian Turbulence Fluctuations within Warm Clouds: Electronic Design, Evaluation of Mater Bi and Poly(lactic Acid) as materials for biodegradable

innovative mini-radiosondes to track small scale fluctuations within clouds. Participation to the 2023 **Meteorological Office, Wessex Convection Campaign** (Chilbolton Observatory Facility, National Satellite Test Facility, UK).

Astrophysical Jets and Solar Wind. Astrophysical jets: insights into long-term hydrodynamics, Hydrodynamics of astrophysical jets: scaled experiments and numerical simulations. Turbulence in the solar wind: spectra from Voyager 2 data at 5AU, Magnetic Turbulence Spectra and Intermittency in the Heliosheath and in the Local Interstellar Medium.

Computational Science/Numerical Methods: pseudo-spectral Navier-Stokes systems, Turbulence Modelling: Large Eddy Simulations, Water Droplet transport and Lagrangian Tracking, Water Droplets collision and population dynamics.

Computational Science/Computer Science: High Performance Computing, parallelization of the pseudospectral Navier-Stokes code, one and two-directions parallelization (PRACE <https://prace-ri.eu/tag/annual-report-2013/>), **Open Source Algorithms for:** - DNS Spectral Codes <https://areeweb.polito.it/ricerca/philofluid/software/95-turbulent-flows.html>, - Transient dynamics of three-dimensional perturbations, - Nonmodal linear stability via the Galerkin method and Chandrasekhar functions expansion <https://areeweb.polito.it/ricerca/philofluid/software/249-hydro-chandraskhar.html>.

INVITED PRESENTATIONS

- July 6th, 2023 - Chilbolton Observatory Facility, NSTF (Observation of fluctuation inside the atmospheric Boundary layer and Warm cumulus cloud by means of cluster of mini radio probes, host Dr. J. Price)
- June 14, 2023 - Dipartimento per lo Sviluppo Sostenibile e la Transizione Ecologica dell'Università del Piemonte Orientale, Lagrangian measurements in the atmospheric boundary layer and inside warm clouds by means of clusters of mini radio probes.
- May 15, 2023 - OATO Osservatorio Astrofisico di Torino, In memory of Attilio Ferrari, Simulation of Young Stellar Objects jets in Earth Laboratory.
- February 1, 2023 - Rome, I3P POLITO and Scientifica VC, presentation of the Cloud-Walker
- January 12, 2023 - Ufficio Valorizzazione dei Risultati della Ricerca, Direzione Ricerca, Rapporti con l'Impresa e Innovazione (RIMIN), Politecnico di Torino, presentation of the pre-Due Diligence del progetto "Cloud-walker", "Tech4Planet", CDP Fondo technology Transfer.

(pre-pandemia Covid-19)

42 Invited Seminars and Conference Talks in Europe and USA. The list, see below, includes Institutions as the Massachusetts Institute of Technology, the California Institute of Technology, the University of Washington, the Politecnico di Milano, the Boeing Aerodynamics Division in Seattle, the University of California Santa Barbara (KITP), the Imperial College London, the Max Plank Institute for Dynamics and Self-Organization, the Princeton University, l'Ecole Normale Supérieure in Lyon, the Stuttgart University, the Karl Weierstrass Institute in Berlin, the CIRA in Capua, the Università degli Studi La Sapienza, the University of Oxford, the ICTP in Trieste, the Darmstadt University, etc.

- December 18, 2019, London, ICL, Dept. of Hydraulics. Acceleration of water droplet population dynamics inside the interfacial layer between cloudy and clear air environments.
- October 8, 2019, Delft University, Laboratorium voor Aero- & Hydrodynamica. Wave focusing and related multiple dispersion transitions in plane Poiseuille flows.
- June 21, 2019, Kloster Banz, Max Plank Institute, Dept. of Dynamics and Self Organized systems. Propagation and morphology of wave packets inside channel flows.
- May 18, 2018 Euromech Colloquium 596, Numerical Simulations of Flows with Particles, Bubbles and Droplets May 11th, 2018, Venice, Italy.
- April 19 2018, UFS, MPDS, Turbulent anisotropic transport in a model cloud interface.
- June 7, 2018, UPMC, Lerma, Paris. Intermittency and cascade rate of turbulent magnetic energy in the inner heliosheath and local interstellar medium from in-situ Voyager 1 and 2 measurements between 100 AU and 140 AU.
- July 14, 2015, ICL, London. 10th IMS Turbulence Workshop, Diffusion in flat turbulence : A comparison with the 3D case.
- May 25, 2014, MIT, Dept of Mathematics, Transients of Three-dimensional Perturbations and the Role of Long Waves in the Plane Wake. Relationships with Turbulence.
- July 4th 2013, Survival distribution of the stretching and tilting of vortical structures in isotropic turbulence. Anisotropic filtering analysis, International Workshop on Small Scale Turbulence, Robert Antonia 70th birthday, Rouen, France.
- June 19th, 2012, Oxford (UK), Turbulence mixing and the study of clouds, VentureFest, Building a Better Economy, Said Business School, Oxford University.

- June 20th, 2012, Oxford (UK), Electron Guns for detecting Space Objects and Movements, Venture Fest, Building a Better Economy, Said Business School, Oxford University.
- September 15, 2011, Warsaw, Shearfree turbulent mixing in presence of a passive scalar and density stratification, Meeting E-COST, European Turbulence Conference.
- March 23rd 2011, The Nature of Turbulence, UC Santa Barbara, Kavli Institute for Theoretical Physics. 11:00 a.m. Daniela Tordella, Politecnico di Torino & KITP Discussion: On Collective Behaviour of Travelling 3D Perturbations in Shear Flows.
- March 24th 2011, The Nature of Turbulence, UC Santa Barbara, Kavli Institute for Theoretical Physics 1:00 p.m. Daniela Tordella Politecnico di Torino & KITP Small Scale Anisotropy in Turbulent Shearless Mixing.
- July 13th 2010, Turbulent diffusion in flat turbulence, J.C. Vassilicos chair, Qualitative Universality, Large and Small-Scale Coherent Structures and Long-Range Memory in Turbulent Flows, July 12-15 2010 IMS Institute for Mathematical Sciences, Imperial College London.
- 1 April 2010, Massachusetts Institute of Technology NUMERICAL METHODS FOR PARTIAL DIFFERENTIAL EQUATIONS Seminar, Transients of Three-dimensional Perturbations and the Role of Long Waves in the Plane Wake. Relationships with Turbulence, Ruben R. Rosales chair, Thursday, April 1, 2010, 16:00 PM, Building 2, Room 105.
- 17 March 2010, Hydrodynamics of hypersonic jets: experiments and numerical simulations, California Institute of Technology, (chair Paul M. Bellan, 8th International Conference on High Energy Density Laboratory Astrophysics, March 15-18, 2010, Pasadena, California, USA, [http:// hedla2010.caltech.edu/](http://hedla2010.caltech.edu/))
- May 8, 2009, Interaction of two isotropic turbulent fields: The two and threedimensional case, large and small scale anisotropy and diffusion speed (chair E. Bodenschatz, International Workshop: Solving the riddle of Turbulence: What, Why, and How?,
- May 6, 2009 Max Plank Institute for Dynamics and Self-Organization, Gottingen, Germany. HYPERLINK "<http://www.lfpn.ds.mpg.de/conference09>"
- December 19th, 2008, Statistics of the interaction between two isotropic turbulent fields and perspectives. Lyon, Ecole Normale Supérieure, France (chair, Jean Francois Pinton, International Cooperation on Turbulence Research), HYPERLINK "<http://www.ictr.eu>" <http://www.ictr.eu>.
- July 2, 2008, Determination of Density and concentration from fluorescent images of a gas flow, Ludwig Prandtl - Fluid Dynamics Seminar (chair E. Bodenschatz), Max Plank Institute for Dynamics and Self-Organization, Gottingen, Germany.
- 10 June 2008 Velocity derivative statistics in the shearless mixing, European Mechanics Society, Euromech Colloquium 501, Mixing of coastal, estuarine and riverine shallow flows, Ancona, G.J. van Heijst, M. Brocchini hosting.
- June 13, 2007 Orr-Sommerfeld Theory of Stability, Progress one-hundred years since its first formulation, Accademia delle Scienze, Classe di Scienze Matematiche, Fisiche e Naturali, Turin, June 13, 2007.
- September 29, 2007 New developments in laboratory hypersonic jets, Work Shop of the Center for Magnetic Self-Organization in Laboratory and Astrophysical Plasmas (CMSO), Alba.
- July 13 2006 - Simulazioni di larga scala, esempi, recenti innovazioni di metodo e discussione critica, CIRA, Capua.
- December 12th 2005 - Dipartimento di Matematica del Politecnico di Milano, nell'ambito delle iniziative MOX-Modellistica e Calcolo Scientifico, "Numerical experiments on the intermediate asymptotics of shear-free turbulent transport and diffusion. Associated similarity analysis".
- October 5th 2005 - Princeton Plasma Physics Laboratory, Center for Magnetic Self-Organization in Laboratory and Astrophysical Plasmas (CMSO), "Simulation of turbulent flows, Supersonic jet experiments", Princeton.
- December 6th 2004 - Large Eddy Simulations method: subgrid models, new wall treatment and boundary conditions. Seminar held at INSA - Centre de Thermique de Lyon, Bat. Sadi Carnot - 69621 Villeurbanne.
- December 22nd 2004 - Turbolenza disomogenea nei fluidi: nuovi risultati per mescolamenti incompressibili e comprimibili. Politecnico di Torino, Dipartimento di Energetica.
- Sept 16th 2004 - Turbulence and instability. Joint Meeting, Ecole Doctorale MEGA de Lyon and Ecole Doctorale SCUDO de Turin. Ecole Centrale Lyon, LMFA.
- June 14th 2004 A new treatment for the large-eddy simulation of near-wall turbulence. Turbulence modelling: art or Science? A symposium in honour of Prof. J. Mathieu. Ecole Centrale Lyon, LMFA.
- February 6th 2004 - LES models. Workshop: High Performance Computing for DNS-LES in Italy, International Center for Theoretical Physics Trieste, February 6, 2004.
- Sept 21st 2000 - Dipartimento di Fisica, Università della Calabria, "Large eddy simulation application to the numerical simulation of astrophysical jets. Introduction to the use of the dynamical procedure", Cetraro.
- June 27th 2000 - Dip. di Matematica, Università di Torino, "Unbounded 2D flow past a finite body: boundary conditions and asymptotic behaviour".
- March 19th 1999 - Dip. di Fisica, Università di Pisa, "Progetto di un esperimento sull'evoluzione spaziale di lungo termine dei getti ipersonici in parziale similitudine con i getti interstellari".
- October 11th 1995 - Dip. di Fisica, Università di Torino, "Mescolamenti turbolenti: effetto della compressibilità sul tasso di crescita spaziale".

- Nov 16th 1992 -Department of Aeronautics and Astronautics, University of Washington, "On the first instability in the transient regime of flow past a circular cylinder", Seattle.
- Nov 17th 1992 - Boeing Defense and Space Group, Kent, WA, USA, "Non steady stability of the flow around the circle in the Föppl model", 17 November 1992.
- August 5th 1992 -Institut für Angewandte Analysis und Stokastik, Karl Weierstrass Institut -Berlin, "A simple model for the aerodynamics of lunate wings".
- July 22 1992 -Department of Mathematic, Technical Hochschule of Darmstadt, "Aerodynamics of curved lifting surfaces".
- May 24th 1991 -Dipartimento di Ingegneria Idraulica, Università La Sapienza, Roma, "Una critica all'applicazione del modello di Landau alla genesi della prima instabilità nei flussi di scia transienti".
- April 18th 1991 -Dip. Ing. Aeronautica e Spaziale, Politecnico di Torino, "Sul flusso vorticoso inviscido attorno al cerchio nella rappresentazione di Föppl: effetto delle non stazionarietà asintotiche sull'instabilità del moto.
- Nov 7th 1990 -Universität Stuttgart, Mathematisches Institut A, "Lunate wings in nature and their mathematical representation for the stationary motion condition".
- Jan 29th 1988 -Dipartimento di Ingegneria Aeronautica e Spaziale, Politecnico di Torino, "Analisi Spettrale di uno Strato di Mescolamento Forzato".
- Feb 18th 1987 -Department of Aeronautics and Astronautics, University of Washington, Seattle, "Forced 2D Turbulent Free Shear Layers".
- June 11th 1986 -Dipartimento di Energetica, Politecnico di Torino, "Misura delle concentrazioni in fluidodinamica, tecniche puntuali e tecniche 2D".

NATIONAL AND INTERNATIONAL COLLABORATIONS

- National Centre for Atmospheric Science, MET Office, Exeter, UK, P. Barret, J. Price
- National Satellite Test Facility, Chilbolton, UK, Darcy Ladd, Chris Walden
- University of Warsaw, Institute of Geophysics (Szymon Malinowski, Marta Waclawczyk).
- MIT, Cambridge, Massachusetts, USA (G. Staffilani, Department of Mathematics)
- MIT, Kavli Institute for Astrophysics and Space Research (J.Richardson, J.W.Belcher)
- University of Alabama at Huntsville (N. Pogorelov)
- University of Tel Aviv, Dept. of Mechanical Engineering (A. Liberzon)
- ISAC CNR Torino (Jost Von Hardenberg) - Politecnico di Torino, DENER (D.Grasso, D.Borgogno) - Politecnico di Milano (M. Belan, A. Abba', G.Passoni, S.De Ponte)
- Università di Torino (S.Massaglia, A.Ferrari, A. Mignone)
- University of Warwick, Coventry, UK (Prof. Robert Kerr)
- Max Planck Institute for Plasma Physics (Ulrich Stroth)
- UNIVERSITE PIERRE ET MARIE CURIE - PARIS 6 (Chantal Stehle)
- Ecole Normale Supérieure Paris Laboratoire de Meteorologie Dynamique (Fabio D'Andrea)
- Max Planck Institute for Dynamics and Self-Organization Goettingen (E. Bodenschatz)
- Weierstrass Institute für Angewandte Analysis und Stokastik, Berlin (S. Proessdorf)
- University of Washington (J. Riley, R.E.Breidenthal, W.H.Christiansen, W.O. Criminale,)
- Darmstadt University, Group of Fluid Dynamics (G.Khujadze, M.Oberlack)
- Cineca, Casalecchio di Reno, Italy (C. Cavazzoni, M. Cestari, High Performance Systems Department)
- Institut Non Linéaire de Nice, Nice, France, L. Ducasse
- International Collaboration for Turbulence Research, ICTR www.icitr.eu
- JETSOT, Joint Experiments Theory and Simulation on Turbulence, Politecnico di Torino, Politecnico di Milano, Università di Torino.
- CMSO, Center for Magnetic Self Organization, USA
- Participation to JETSET, JET Simulations, Experiments and Theories, Marie Curie Research Training Network, Coordinator Thibaut Lery - lery@cp.dias.ie Cosmogrid - Dublin Institute for Advanced Studies, 2005-2008. - Coordinator with M.Onorato for the Politecnico di Torino of the AeroTraNet-Marie Curie Research Training Network, 2006-2009 (AeroTraNet, Marie Curie Actions, Host Fellowships EST). Network: University of Leicester (A. Rona), INP de Toulouse (C. Airiau), Università degli Studi Roma Tre, (G. Guj and R.Camussi).

PUBLICATIONS

Links to: ORCID: 0000-0002-4639-0572, ResearcherID:F-6686-2013, Google Scholar (172 items, HI 15, i10-index 26) PORTO@IRIS (216 Items). Since 1989, I am the corresponding author of all my peer reviewed ISI articles (90 % in the Q1 ranking quartile).

JOURNAL PAPERS, last 20 years

2023 S Abdunabiev, A Merlone, C Musacchio, M Paredes, E Pasero, D Tordella, Validation and traceability of multi-parameter miniaturized radiosondes for environmental observations, June 2023, arXiv preprint [arXiv:2301.09928](https://arxiv.org/abs/2301.09928), submitted to

Measurement, Elsevier

2022 Fossa, L Abdunabiev, S Golshan, M Tordella, D

Microphysical timescales and local supersaturation balance at a warm cloud top boundary

PHYSICS OF FLUIDS, VL 34, IS 6, AR 067103, DI 10.1063/5.0090664, WOS:000806631400023

2022 L. Gallana, M. Golshan, S. Abdunabiev and D. Tordella Diffusion of turbulence following both stable and unstable step stratification perturbations. PHYSICS OF FLUIDS, VL 34, IS 6, AR 065122, DOI 10.1063/5.0090042, WOS:000829927300001

2021 Mina Golshan, Shahbozbek Abdunabiev, Mattia Tomatis, Federico Fraternali, Marco Vanni, Daniela Tordella, Turbulent transients of monodisperse and polydisperse distributions of water drops through unstable borders of cloudy environments, INTERNATIONAL JOURNAL OF MULTIPHASE FLOW, Volume 140, Article Number 103669, DOI10.1016/j.ijmultiphaseflow.2021.103669, 2021.

2021 Federico Fraternali, Gabriele Nastro; Daniela Tordella, Wave focusing and the related multiple dispersion transitions in plane Poiseuille flows, PHYSICS OF FLUIDS, VL 33, IS 3, AR 034101, DOI 10.1063/5.0037825, WOS:0006310337000010

2021 Paredes Quintanilla, Miryam E., Abdunabiev, Shahbozbek, Allegretti, Marco, Merlone, Andrea, Musacchio, Chiara, Pasero, Eros G. A., Tordella, Daniela, Canavero, Flavio. Innovative Mini Ultralight Radioprobes to Track Lagrangian Turbulence Fluctuations within Warm Clouds: Electronic Design. SENSORS, VL 21, IS 4, AR 1351, DOI 10.3390/s21041351, UT WOS:000624656500001.

2020 Tessa C Basso; Giovanni Perotto; Chiara Musacchio; Andrea Merlone; Athanassia Athanassiou; Daniela Tordella; Evaluation of Mater Bi and Polylactic Acid as materials for biodegradable innovative mini-radiosondes to track small scale fluctuations within clouds. **Materials Chemistry and Physics**, VL 253, AR 123411, DOI 10.1016/j.matchemphys.2020.123411, WOS:000571675000012

2019 Fraternali, F., Pogorelov, N.V., Richardson, J.D., Tordella, D. Magnetic Turbulence Spectra and Intermittency in the Heliosheath and in the Local Interstellar Medium (2019) Astrophysical Journal, 872 (1), art. no. A40

2019 Fraternali, F., Pogorelov, N.V., Richagrdson, J.D., Tordella, D. The structure of magnetic turbulence in the heliosheath region observed by Voyager 2 at 106 AU (2019) Journal of Physics: CS 1225 (1), art. no. 012006

2018 Fraternali, F., Domenicale, L., Staffilani, G., Tordella, D. Internal waves in sheared flows: Lower bound of the vorticity growth and propagation discontinuities in the parameter space (2018) Physical Review E, 97 (6), art. no. 063102

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SCIENTIFIC PROJECTS COORDINATED

A list of the finalized projects where I served as the project coordinator and/or scientific responsible includes 19 national and international projects. The total funded amount is about 5 M euro.

MET OFFICE, WESSEX CONVECTION - POLITO Cloud Walker, in field Atmospheric Boundary layer Fluctuation Measurement Campaign, July 2023.

PI MIGRE- Proof of Concept, Fondazione Links, Mini green ultralight expendable radio sonde for micro-physical remote sensing in warm clouds and the low atmosphere, 2022, 50.000 euro)

Co-Investigator with Nicolai Pogorelov, NASA ROSES-2018 (NASA Research Announcement NNH18ZDA001N for Research Opportunities in Space and Earth Science 2018). Turbulence as Indicator of Physical Processes at the Heliospheric Interface (18 HGIO182 0029), 520.000 USD.

Principal Investigator, H2020 Marie Skłodowska Curie Action, ITN ETN COMPLETE, Cloud Microphysics, Turbulence and Telemetry, 2016-2021 Project 675675, 3.600.000 euro

Principal Investigator, MISTI SEEDS FUNDS, MITOR, Long term interaction in flow system, CO-I, G.Staffilani MIT-Math, 2014-2016 (22000 euro), 2018-021 (22000)

CO-Investigator, MISTI SEEDS FUNDS, MITOR, PI JD Richardson, MIT, Kavli Inst., Laboratory Simulation Of Planet-Solar Wind And Interstellar Medium/Heliosphere Interactions, 2013-2016 (18000 euro) .

Tier-0 PRACE awarded project, April 2012, "Fluid turbulence: self and passive scalar diffusion. Application to stably stratified flows" (<http://www.prace-ri.eu/PRACE-4th-Regular-Call>) 3000000 Curie Fat Nodes Hours

PROGETTO LAGRANGE-FONDAZIONE CRT (BORSE DI DOTTORATO XXVI CICLO, 2011-2013, 60.000 euro) h Corso di Dottorato in Fluidodinamica, To what extent spectra of turbulent flows are linked to the nonlinear interaction among their different modes?

MISTI- Global Seeds Funds, MIT- Joint proposal with Turin Politecnico; Italy: Long term interaction in flow systems, proponents Daniela Tordella, Politecnico di Torino DIASP, and Ruben R. Rosales, MIT Department of Mathematics, 20102012 (15.000 euro).

IS CRA Projects: first 2010 Call for Proposals Italian Super Computing Resource Allocation <http://hpc-iscra.cineca.it/Call1->

results.html Type A, PI TORDELLA Daniela, Turbulent mixing and diffusion, Budget: 300000 CPU hours (maximum request of resources allocated).

Coordination with M. Onorato for the Politecnico di Torino of AEROTRANET, Human Resources and Mobility (HRM) Activity, MARIE CURIE ACTIONS, Host fellowships for Early Stage Research Training (EST), 2006-2010, 870.000 euro.

Coordinator of Progetto Regione Piemonte E60, 2006-2011, Metodi instazionari innovativi per la simulazione dei flussi turbolenti su superfici di velivoli, 65.000 euro

Participation to Progetto Regione Piemonte E59, 2006-2010, Nuovi concetti e tecnologie per lo sviluppo di velivoli ultraleggeri innovative, 65.000 euro.

HPC-Europe HLRS Stuttgart, grant 2007

HPC-Europe BSC Barcellona, grants 2005, 2006

PRIN 2005-2007, coordinator of the engineering unit of research, Evoluzione di medio-lungo termine dei getti ipersonici: visualizzazione, misure di densità e concentrazione, simulazioni numeriche. Applicazioni ai getti interstellari (95.000 euro) Area Scientifico Disciplinare 02: Scienze fisiche 50% (Università di Torino), Area Scientifico Disciplinare 09: Ingegneria industriale e dell'informazione 50% (Politecnico di Torino and Politecnico di Milano).

COFIN 2002, responsabile di unità di ricerca, progetto Simulazioni numeriche e di laboratorio di getti ipersonici. Settori scientifico-disciplinari interessati dal Programma di Ricerca: FIS/05 - ASTRONOMIA E ASTROFISICA, ING-IND/06 FLUIDODINAMICA (55.000 euro).

CINECA, Dipartimento Calcolo ad Alte Prestazioni, CPU Resources Grant 1627S, 2000-2001, Evoluzione ed interazione del sistema di urti e delle strutture turbolente di larga scala nei getti ipersonici. Simulazioni numeriche e loro confronto con simulazioni di laboratorio. 100000 core hours on FERMI.

ASI, Agenzia Spaziale Italiana, Fundamental Research, 1999-2000, 2001-2002, 150 M Lire, coordinator of the engineering part of the Project Hypersonic Jets, laboratory and numerical simulations. Gasdynamical and Astrophysical Applications.

COFIN 1999-2000: Simulazione Sperimentale di Getti Ipersonici, applicazioni astrofisiche. Progetto Plasmi Astrofisici, Cofinanziamento MURST di Astrofisica e Fisica Cosmica (30 M Lire).

1997-1999, coordinator of the Project ASNESGI, 60 M lire, Consiglio Nazionale delle Ricerche, Analisi sperimentale e numerica dell'evoluzione spaziale di getti ipersonici (Experimental and numerical analysis of the intermediate-long term evolution of hypersonic jets).

AWARDS

- 2014 Italian National Scientific Qualifications awarded for Full Professor positions, Academic Field, 09/A1 - ING/IND-06 Fluid Dynamics - 2013, PRACE, Partnership for Advanced Computing in Europe Award: "Fluid turbulence: self and passive scalar diffusion. Application to stably stratified flows", see PRACE success story published in the PRACE Report 2013, - 2012 IOP, the Institute of Physics: Article "Astrophysical jets: insights into long-term hydrodynamics" (<http://iopscience.iop.org/1367-2630/13/4/043011>), New Journal of Physics (NJP) best paper, see 'Highlights of 2011' of the Institute of Physics. Articles chosen on the basis of referee endorsement, impact and broad appeal. - 2010 Progetto Lagrange, PhD Grant Award, Fondazione CRT: To what extent spectra of turbulent flows are linked to the nonlinear interaction among their modes? - May 8th, 2008 Politecnico di Torino, Accelerazione di Carriera Award (Politecnico di Torino, Conto Consuntivo 2008) - 2005 American Physical Society-Division Fluid Dynamics Mobility Award - 1988 NATO-CNR Award for the research activity carried out abroad, see Title 20.

PATENTS

- deposito della domanda di brevetto internazionale in data May 18, 2023 odierna al numero PCT/IB2023/055125 rivendicante la priorità della domanda italiana n. 102022000010403. **PLT090-PCT** "SCIAME LAGRANGIANO DI MINI-RADIOSONDE PER MONITORAGGIO ATMOSFERICO ED AMBIENTALE E RELATIVO METODO DI FUNZIONAMENTO"

- POLITECNICO di TORINO. 2021. Richiesta di Brevetazione/Registrazione. D. Tordella, E. Pasero, M. Paredes, S. Abdunabiev, M. Allegretti, V. Randazzo. Mini Green Ultralight expendable radio sonde for micro-physical remote sensing in warm clouds and the low atmosphere. n. 102022000010403 (rif 2021-022)

SOFTWARE

Over the last 20 years we have developed a number of open source software packages in the areas of Hydrodynamic Stability and Turbulent Flows (NS DNS codes with one and two dimensional parallelization).

Links to this software can be found in: <https://areeweb.polito.it/ricerca/philofluid/software/96-hydrodynamic-stability.html> <https://areeweb.polito.it/ricerca/philofluid/software/249-hydro-chandraskhar.html> <https://areeweb.polito.it/ricerca/philofluid/software/95-turbulent-flows.html>

I designed the research group website called PhiloFluid HYPERLINK "<http://areeweb.polito.it/ricerca/philofluid/>" of which I am the scientific responsible and administrator and that was opened in April 2012. The site also contains a section dedicated to databases HYPERLINK "<http://areeweb.polito.it/ricerca/philofluid/database.html>" and a section dedicated to software open access under GNU General Public Licenses HYPERLINK "<http://areeweb.polito.it/ricerca/philofluid/software.html>". To date, the site has been visited 31253 times, which places it in the fifth position among the most visited POLITO engineering research websites.

TEACHING:

PHD

- - Politecnico di Torino, Doctoral School, SCUDO, 02LDJKH, Introduction to the Hydrodynamic Stability, 2005- 2017.
- - International Center for Mechanical Sciences (CISM, <http://www.cism.it>), Dynamics of the Flow Past a Bluff Body, Advanced Doctoral School coordinated by D.Tordella, The Fiszdon Session, Udine, Academic Year 2006.
- - H2020 MSCA ETN ITN COMPLETE: as Coordinator, I have proposed and supervised in the years 2017-2018- 2019, the Network Spring-Summer-Winter Training Schools on Microphysics of Warm Clouds, see www.complete-h2020network.eu/training

MASTERS

- - Hydrodynamic stability in fluid and plasma flows, Laurea Magistrale in Aeronautical and Aerospace Engineering, Laurea Magistrale in Mathematics for the Engineering Sciences, Laurea Magistrale in Sistemi Complessi, 2020- present, - 17AXOLZ, All first year cohorts, Fisica I, laboratory (10 cfu), 2019-2020, -Turbulent Flows, 02GDWFQ, Laurea Magistrale in Aeronautical and Aerospace Engineering, 2007/2008 present, - Numerical Simulation of Turbulent Flows, 01IIJFQ, Laurea Magistrale in Aeronautical and Aerospace Engineering, 2006/2007 2011/2012, - Fluid Dynamics, 05AYFGE, Laurea Magistrale in Mathematics for the Engineering Sciences, 2002/2003 - 2018-2019,
- - Environmental Fluid Dynamics, Master of Science in Environmental Engineering, 1997/98, - Fluid Dynamics, Master of Science in Mechanical Engineering, 1992/93 - 2004/05, - Seminars of Introduction to the Bachelor in Mathematics for Engineering Sciences 1990/91, 1991/92, - Physics of Fluids, Aeronautics and Aerospace Engineering Bachelor, assistant 1989/90, 1990/91, 1991/92, - Fluid Dynamics, Mechanical Engineering Bachelor, assistant 1989/90, 1990/91, 1991/92, - Experimental Aerodynamics, Aeronautics and Aerospace Engineering Bachelor, assistant 1988/89, 1990/1991, - Gasdinamica II, Aeronautics and Aerospace Engineering Bachelor, assistant 1984/85, 1985/86.

DOCTORAL AND POST-DOCTORAL SUPERVISION

PhD Students

1. M.Belan (1996-2000) Weakly nonlinear dispersive wave packets. Application to the wake of the bluff body (now assistant professor al Politecnico di Milano)
2. M.Iovieno (1999-2002) Angular momentum application in Fluid Dynamics (now assistant professor al Politecnico di Torino)
3. S.Scarsoglio (2005-2008) Instability of nonparallel flows
4. P.Bailey, UK (2006-2009) Velocity-pressure correlation in turbulent recirculating wall flows
5. Francesca De Santi, I (2010-) Instability in shear and stably stratified flows
6. Silvio di Savino, I (2010-2014), Small-scale turbulence
7. Luca Gallana, I (2013-2016) Stratified turbulence, passive scalar turbulent transport
8. Federico Fraternali, I (2014-2018) Weak turbulence, Voyager 2 solar wind data analysis
9. Tessa Basso, Italian -Australian (2017-2019), New materials for radio sonde biodegradable balloons to measure fluctuations in warm atmospheric clouds.
10. Tarapasrad Bhowmick, India (2017-2019), Numerical simulation of the interface flow between warm clouds and clear air.
11. Mina Golshan, Iran (2017-), Nucleation, collision and coalescence of water droplets in warm cloud interfaces with the environment.
12. Miryam Paredes, Ecuador, Electronic design of innovative mini ultralight radioprobes aimed at tracking lagrangian turbulence fluctuations within warm clouds, in coordination with Prof. F. Canavero (2017-2021)
- 13 Shahbozbek Abdunabiev (2020-), Uzbekistan, Analysis of telecommunication measurement and numerical simulation inside warm clouds.

Post-Doctoral fellows

Marco Belan 2001, Michele Iovieno (2003-2004), Stefania Scarsoglio (2008), Lauris Ducasse (2010, 2011), Federico Fraternali (2018-2019).

Post-Graduate Research Grants

- M.Iovieno 2002 - A.Zito (October 2006-Jan 2007) on a new POLITO Immersed Boundary Navier Stokes code (Polito IB-NS cfd code), Grant Regione Piemonte E60 2004 - M. Giordanello (Jan 2007 - April 2007) FV Computational Mesh for the study of the flow about a finite wing, Grant Regione Piemonte E59 2004 - C.Tribuzi (Jan 2007-Jan 2008) LES and DNS using the new POLITO IB-NS cfd code, use of STAR-CCM+ cfd code for RANS simulations about finite flat and curved wings, Grant Regione Piemonte E59 2004 - M. Novara (June 2007-May 2009) LES and DNS using the new POLITO IB-NS cfd code, parallelization of the code at CINECA-Bologna, Grant Regione Piemonte E60 2004. - Federico Fraternali 2017 - Mina Golshan 2020 - Shahbozbek Abdunabiev 2019 - Ludovico Fossa' 2021 - Miryam Paredes 2021-2022 - Pierpaolo Di Felice 2023

MASTER THESES

On average, since 1989, I have advised 3 Master Theses per academic year (Laure Magistrali in Ingegneria Meccanica, Aerospaziale, Matematica). In the last seven years, the list is: Niccolo Gallino 2023, Beatrice Cota, 2022 Chiara Geron 2021-, Luca Cattarossi 2021-, Andrea Caporali 2021, Leonardo Pollini 2021, Davide Procacci 2020, Giovanni Cipri 2020, Mattia Tomatis 2019, Ludovico Fossa' 2019, Navid Monshi Tousi 2018, Felice Roselli 2018, Loris Domenicale 2018, David Codoni, 2018, Beatrice Battisti 2018, Gabriele Nastro 2017, Sadaphul Abhishek, 2017, Luigi Caruso, 2017, Giovanni Viciconte 2016, Maurizio Carbone 2016.

International students:

In collaboration with the Massachusetts Institute of Technology, Departments of Mathematics, Mechanics, Aerospace Engineering I have co-advised 3 students: Rachel Morgan, Visiting Bachelor Student, Aerospace Engineering, June-July 2015, Kristopher Weaver, Visiting Bachelor Student, Massachusetts Institute of Technology, June 2011 Whitney Thomas, Visiting Master Student, University of Washington, 2008-2009.

In collaboration with the University of Washington, Seattle, Jessica A. Benthuyssen, Visiting Bachelor Student, 2004 In collaboration with ENSTA, Ecole Nationale Supérieure des Techniques Avancées, Paris, supervision of 3 Master Students.

During their stages abroad, Marie Petitot 2012, Ouael mansour 2013, Mathieu- Catchirayer 2013. In the years 1999-2004 in the context of the Erasmus EU Program, in collaboration with the Imperial College of London, I had been a co-advisor for four Bio-Engineering students.

LANGUAGES: English, French, Italian