



Andrea Tosin

General Information

Name, Surname Andrea Tosin
Nationality Italian
Date of birth 22nd September 1980
Place of birth Torino, Italy
Gender Male

Education

Studies

PhD (2008) Mathematics for Engineering Sciences (Politecnico di Torino, Italy)
MSc (2004) Mathematical Engineering (Politecnico di Torino, Italy)
BSc (2002) Mathematics for Engineering Sciences (Politecnico di Torino, Italy)

Languages

Italian Native
English TOEFL (CBT)
French DELF A1-A4

Score: 270/300
Score: 307.70/360

Academic Positions

Current

Apr 20–present Full Professor of Mathematical Physics (MAT/07)
Department of Mathematical Sciences “G. L. Lagrange”
Politecnico di Torino
Address Corso Duca degli Abruzzi 24, 10129 Torino, Italy
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Previous

Oct 15–Apr 20 Associate Professor of Mathematical Physics (MAT/07)
Department of Mathematical Sciences “G. L. Lagrange”
Politecnico di Torino
Torino, Italy
Oct 11–Oct 15 Researcher
Istituto per le Applicazioni del Calcolo “M. Picone”
Consiglio Nazionale delle Ricerche
Roma, Italy

Nov 08–Sep 11 INdAM Postdoctoral Fellow
 Department of Mathematics
 Politecnico di Torino, Italy
 Funding Agency: Compagnia di San Paolo

Oct 07–Oct 08 Research Fellow
 Istituto per le Applicazioni del Calcolo “M. Picone”
 Consiglio Nazionale delle Ricerche (Roma, Italy)
 Funding Agency: University of Salerno (Fisciano SA, Italy)

Prizes and Honours

2017 National Grant for Fundamental Research (FFABR) – Grant: 3 k€
 2013 SIMAI 2013 prize for young scientists in Applied Mathematics
 2011 INdAM-SIMAI 2010 prize for the best Italian PhD theses in Applied Mathematics

Scientific Activity

Research

Research Field Mathematical Physics

Research statement My research consists mainly in revisiting the classical methods of kinetic theory (Boltzmann-type collisional equations, Fokker-Planck asymptotics, hydrodynamic limits) and those of the transport of measures to investigate emerging multiscale problems in the realm of interacting multi-agent systems.

Research Topics Interacting multi-agent systems, vehicular traffic, social systems, crowd dynamics, population dynamics

Methods Kinetic theory, multiscale conservation laws, transport and diffusion equations, numerical simulations

Coordination of Research Groups

- Head of a local research group (at the Department of Mathematical Sciences “G. L. Lagrange” of Politecnico di Torino) devoted to the modelling, analysis and numerical treatment of multi-agent systems by means of mathematical methods of the kinetic theory
- 2012-2020 National coordinator of the SIMAI Activity Group on Complex Systems (SisCo-SIMAI)

Projects and Grants

2021-2023 PRIN (Research Project of Relevant National Interest)

Title Integrated Mathematical Approaches to Socio-Epidemiological Dynamics

Role Principal Investigator

Grant 465 k€

Project description <https://staff.polito.it/andrea.tosin/pdf/PRIN2020.pdf>

2016-2020 Compagnia di San Paolo Starting Grant “Attracting Excellent Professors”

Title Vehicular and pedestrian traffic models: from flow forecast to safety management

Role Principal Investigator

Grant 100 k€

Project description <https://staff.polito.it/andrea.tosin/pdf/TraForSafe.pdf>

2011 INdAM-GNFM Young Researchers Project

Title Multiscale methods and models for collective behaviors in living complex systems

Role Principal Investigator

Grant 2 k€

Project description https://staff.polito.it/andrea.tosin/pdf/INdAM-GNFM_project.pdf

Participation in Other Research Projects

- 2017 PRIN
Title Innovative numerical methods for evolutionary partial differential equations and applications
Role Participant
- 2012 Google Research Award
Title Multi-population models for vehicular traffic and pedestrians
Role Participant
- 2010–2014 FP7 NoE HYCON2
Title Highly-complex and networked control systems
Role Participant (CNR Unit)
- 2011–2013 PRIN
Title Nonlinear hyperbolic problems for applications
Role Participant
- 2009–2011 PRIN
Title Mathematical models of mechanical interactions of cells and cell aggregates with the surrounding environment
Role Participant
- 2006–2008 PRIN
Title Mathematical models of growth and vascularisation of tumours and biological tissues
Role Participant
- 2005 INdAM Project
Title Traffic flows and optimization on complex networks
Role Participant

Research Partnerships with Public and Private Companies

- 2020 MSc thesis in Mathematical Engineering (Politecnico di Torino) in partnership with Thales Alenia Space S.p.A. on the topic: “Virtual Shaker Testing of a large satellite with uncertainty quantification of the mechanical stiffness”
- 2019 Signing of a Memorandum of Understanding with Oasys Ltd. for joint teaching and research activities on the mathematical modelling and the numerical simulation of crowd dynamics in built environments
- 2017 Cooperation agreement within the research project “Design Experience at Juventus Stadium: a New Concept Design for the Omar Sivori Club”

Organisation of Conferences and Conference Sessions

- Dec 21 “Numerical Aspects of Hyperbolic Balance Laws and Related Problems - Young Researchers Conference” – Verona, Italy
- Oct 20-Dec 21 “MAIn 2021 - Mathematics for Artificial Intelligence”
Online seminar cycle
- Sep 19 “Models and Applications”
Section S9 of the 21st UMI (“Italian Mathematical Union”) Congress – Pavia, Italy
- Jul 19 “Mathematical descriptions of traffic flow: micro, macro and kinetic models”
Mini-symposium within the ICIAM 2019 Congress – Valencia, Spain

- Oct 18 “Recent trends in kinetic modelling and related fields” – Torino, Italy
- Oct 18 “Problems in discrete dynamics: from biochemical systems to rare events, networks, clustering and related topics - IV Edition” – Arcidosso, Italy
- Sep 18 “Advances in kinetic theory”
Thematic session within the UMI-SIMAI-PTM Joint Meeting – Wrocław, Poland
- Jul 18 “Models and numerical methods in kinetic theory”
Special session within the 12th AIMS Conference on Dynamical Systems, Differential Equations and Applications – Taipei, Taiwan
- Oct 17 “Problems in discrete dynamics: from biochemical systems to rare events, networks, clustering and related topics - II Edition” – Arcidosso, Italy
- Jul 14 “Complex Systems (vehicular traffic, crowd dynamics, biological systems, social systems)”
Mini-Symposium within the SIMAI 2014 Congress – Taormina ME, Italy
- Nov 12 “From individual to collective behaviour: crowds and swarms” – Roma, Italy
- Jun 10 “Crowd and swarm dynamics: interactions, self-organization, mathematics, applications”
Young Researcher Mini-Symposium within the SIMAI 2010 Congress – Cagliari, Italy

Editorial Activity

- 2018-present Associate Editor of *Mathematics and Computers in Simulation* (Elsevier)
- 2012-present Member of the Editorial Board of *SEMA SIMAI Springer Series*
- 2013-2015 Member of the Editorial Board of the Springer-Birkhäuser Series (Boston, USA) *Modeling and Simulation in Science, Engineering and Technology*

Referee of Scientific Papers

- Referee for
 - Acta Applicandae Mathematicae • Applied Mathematical Modelling • Applied Mathematics and Computation • Communications in Mathematical Sciences • Comptes Rendus – Mecanique • Computers & Mathematics with Applications • Discrete and Continuous Dynamical Systems – Series B • Journal of Computational and Applied Mathematics • Journal of Computational Physics • Journal of Differential Equations • Journal of Mathematical Analysis and Applications • Journal of Mathematical Biology • Journal of Physics A: Mathematical and Theoretical • Journal of Theoretical Biology • Kinetic and Related Models • Mathematical Models and Methods in Applied Sciences • Multiscale Modeling & Simulation • Networks and Heterogeneous Media • New Journal of Physics • Philosophical Transactions of the Royal Society A – Mathematical, Physical and Engineering Sciences • Physica A • SIAM Journal on Applied Dynamical Systems • SIAM Journal on Applied Mathematics • SIAM Journal on Control and Optimization • The IMA Journal of Applied Mathematics • Transportation Research Part C: Emerging Technologies • Vietnam Journal of Mathematics

Publons Certified referee activity: <https://publons.com/a/591032>

Referee of Research Projects

- 2017 Referee of a proposal presented at the PALM (“*Physics: Atoms, Light, Matter*”) Laboratory, University of Paris-Saclay, on the topic: “Complex Systems: from systems out of equilibrium to the biological matter”

Referee of PhD Theses

- 2020 PhD candidate: Martina Conte
Thesis: “Mathematical models for glioma growth and migration inside the brain”
PhD programme in Mathematics, Basque Center for Applied Mathematics, Spain
- 2019 PhD candidate: Marta Marulli
Thesis: “Mathematical model for ionic exchanges in renal tubules: the role of epithelium”
PhD programme in Mathematics, *Alma Mater Studiorum* University of Bologna, Italy

- 2019 PhD candidate: Elisa Iacomini
Thesis: “Mathematical models and methods for traffic flow and stop & go waves”
PhD programme in Mathematical Models for Engineering, Electromagnetism and Nanoscience, “Sapienza” University of Rome, Italy
- 2018 PhD candidate: Veronica Tora
Thesis: “Mathematical models for brain diseases: formation of senile plaques and neurofibrillary tangles in Alzheimer’s disease”
PhD programme in Mathematics, *Alma Mater Studiorum* University of Bologna, Italy
- 2018 PhD candidate: Marco Torregrossa
Thesis: “Modeling of socio-economic phenomena by Fokker-Planck equations”
Joint PhD programme in Mathematics, University of Pavia, University of Milano Bicocca and INdAM, Italy
- 2017 PhD candidate: Domenico Brunetto
Thesis: “MOOCs and active learning in mathematics: educational and mathematical modelling for classroom practices”
PhD programme in Mathematical Models and Methods in Engineering, Politecnico di Milano, Italy

Postdoctoral Students and Research Fellows

- Jul 21–present Martina Conte
Postdoc, Politecnico di Torino, Italy
Research topic: Nested mathematical models in Biomedicine
- Jan 20–present Felisia Angela Chiarello
Postdoc, Politecnico di Torino, Italy
Research topic: Kinetic equations and conservation laws for modelling and simulating multi-agent systems
- Nov 19–present Nadia Loy
Postdoc, Politecnico di Torino, Italy
Research topic: Kinetic equations and conservation laws for modelling and simulating multi-agent systems
- Jun 17–Aug 17 Sebastiano Roncoroni
Research fellow, Politecnico di Torino, Italy
Research topic: Boltzmann-type kinetic equations for the study of non-homogeneous vehicular traffic
- Jan 17–Jul 18 Mattia Zanella
Postdoc, Politecnico di Torino, Italy
Research topic: Kinetic models of multi-agent systems, Fokker-Planck asymptotics and related numerical approximations
- Jan 13–May 15 Fabio S. Priuli
Postdoc, University of Rome “Tor Vergata” and IAC-CNR, Italy
Research topic: Optimisation of pedestrian flows in complex environments
Co-supervised with Emiliano Cristiani
- Jan 12–Dec 15 Marco Scianna
Postdoc, Politecnico di Torino, Italy
Research topic: Multiscale models of environment sensing in cell aggregates and human crowds

PhD Students

- Oct 16–Sep 19 Nadia Loy
Politecnico di Torino, Italy
Thesis: “Kinetic models for cell migration and their hydrodynamic limits”
Co-supervised with Prof. Luigi Preziosi
- Nov 15–Oct 18 Raul De Maio
“Sapienza” University of Rome, Italy
Thesis: “Multiscale methods for traffic flow on networks”
Co-supervised with Prof. Fabio Camilli

- Jan 14–Dec 16 Giuseppe Visconti
University of Insubria, Como, Italy
Thesis: “Single- and multi-population kinetic models for vehicular traffic reproducing fundamental diagrams and with low computational complexity”
Co-supervised with Prof. Gabriella Puppo and Dr. Matteo Semplice
- Jan 12–Dec 15 Alessandro Corbetta
Politecnico di Torino, Italy & TU/e Eindhoven, the Netherlands
Thesis: “Multiscale crowd dynamics: physical analysis, modeling and applications”
Co-supervised with Prof. Luca Bruno, Prof. Adrian Muntean, Prof. Federico Toschi

MSc Students

- Under way Giacomo Cravero
MSc Mathematical Engineering, Politecnico di Torino, Italy
Thesis topic: Models of multi-modal transportation systems
Co-supervised with Dr. Marco Scianna
External Company: Hitachi Rail (representative: eng. Maurizio Pichierri)
- Oct 21 Federico Etori
MSc Engineering Physics, Politecnico di Milano, Italy
Thesis: “Out-of-equilibrium Monte Carlo simulations of the Ising model”
Co-supervised with Prof. Paolo Biscari
- Jul 21 Giacomo Masali
MSc Mathematical Engineering, Politecnico di Torino, Italy
Thesis: “Spread and containment of infectious disease epidemics: a kinetic approach”
Co-supervised with Dr. Nadia Loy
- Jul 21 Serena Russo
MSc Mathematical Engineering, Politecnico di Torino, Italy
Thesis: “Modelling the diffusion of an infectious disease by kinetic equations for metapopulations”
Co-supervised with Dr. Nadia Loy
- Oct 20 Adele Ravagnani
MSc Physics of Complex Systems, Politecnico di Torino, Italy
Thesis: “Phase transition in vehicular traffic: a Boltzmann-type kinetic approach”
Co-supervised with Dr. Mattia Zanella
- Apr 20 Andrea Medaglia
MSc Physics, University of Milan, Italy
Thesis: “Kinetic-controlled non-Maxwellian traffic models with driver-assist vehicles”
Co-supervised with Dr. Mattia Zanella
- Mar 20 Matteo Defilippi
MSc Mathematical Engineering, Politecnico di Torino, Italy
Thesis: “Uncertainty quantification of mechanical stiffnesses in a base-shake sine test of a spacecraft”
Co-supervised with Dr. Mattia Zanella
External Company: Thales Alenia Space (representative: eng. Pietro Nali)
- Oct 18 Luca Lanzilao
MSc Mathematical Engineering, Politecnico di Torino, Italy
Thesis: “Mathematical models of crowd-to-structure action in footbridges at different scales”
Co-supervised with Dr. Fiammetta Venuti
- Oct 15 Raul De Maio
MSc Applied Mathematics, “Sapienza” University of Rome, Italy
Thesis: “A multiscale approach to vehicular traffic”
Co-supervised with Prof. Eugenio Montefusco
- Dec 10 Anna Scotti
MSc Mathematical Engineering, Politecnico di Torino, Italy
Thesis: “The role of hanger slackening in footbridge dynamics: mathematical modelling and engineering outcomes”
Co-supervised with Prof. Luca Bruno, Dr. Fiammetta Venuti

- Dec 08 Miriam Pirra
MSc Mathematical Engineering, Politecnico di Torino, Italy
Thesis: "Modelling pedestrian traffic by conservation laws with non-local flux"
Co-supervised with Prof. Luigi Preziosi
- Dec 07 Mattia Bozzola
MSc Mathematical Engineering, Politecnico di Torino, Italy
Thesis: "Immersed boundary method applied to tumor cord development"
Co-supervised with Dr. Davide Fransos, Prof. Luigi Preziosi
- Jul 07 Paola Latorraca
MSc Mathematical Engineering, Politecnico di Torino, Italy
Thesis: "Qualitative analysis of a multiphase model for the growth of tumor cords"
Co-supervised with Prof. Luigi Preziosi

BSc Students

- Underway Daniele Poggio
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis topic: From Particle Swarm Optimisation to Consensus-Based Optimisation and Support-Vector Machines
- Underway Sara Venuto
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis topic: Compartmental models for the spreading of infectious diseases
- Underway Matilde Tozzi
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis topic: Implementation of GNU Octave packages for particle optimisation algorithms
Co-supervised with Prof. Stefano Scialò
- Oct 21 Cecilia Campanile
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis: "Kinetic models of the spreading of an epidemics with quarantine"
- Oct 21 Carlotta Filippin
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis: "Kinetic models of vehicular traffic"
- Sep 21 Ludovica Appignani
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis: "The Euler equations"
- Sep 21 Matteo Bianco
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis: "Analytical comparison of particle optimisation methods"
- Sep 21 Debora Bisoglio
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis: "Non-standard solutions for macroscopic models of crowd dynamics"
- Sep 21 Davide Leo
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis: "Multilayer perceptron and Particle Swarm Optimisation"
- Jul 21 Alessia Loncini
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis: "Kinetic models for opinion dynamics"
- Jul 21 Federica Padovano
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis: "A mathematical model of the progression of Alzheimer's disease"
- Jul 21 Giorgio Racca
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis: "Consensus-Based Optimisation algorithm: convergence to global minima and application to Machine Learning"

- Jul 21 Erika Rongoni
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis: "Mathematical models of aerial traffic control management"
- Mar 21 Davide Grande
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis: "The Monte Carlo method for the Boltzmann equation"
- Mar 21 Gabriele Segà
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis: "Non-conservative kinetic models for the spread of infectious diseases with quarantine"
- Dec 20 Carmen Frasca
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis: "Boltzmann-type analysis and simulation of simple market economies"
- Oct 20 Alessandro Baldi
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis: "Kinetic models of opinion formation and numerical simulations"
- Oct 20 Maria Anna Consoli
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis: "Markov models for consensus in multi-agent systems"
- Sep 20 Matteo Rufolo
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis: "Kinetic equations for the analysis of the wealth distribution"
- Jul 20 Matteo Raviola
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis: "A kinetic approach to the Sznajd model of opinion formation on social networks"
- Mar 20 Valentina Crivello
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis: "Boltzmann and Fokker-Planck models for wealth distribution"
- Mar 20 Martina Fraia
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis: "A kinetic reinterpretation of the Sznajd model of opinion formation"
- Dec 19 Stefano Peirone
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis "Direct methods of the Calculus of Variations"
- Oct 19 Elena Pitino
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis: "Kinetic equations for opinion dynamics in multi-agent systems"
- Sep 19 Giulia Della Croce Di Dojola
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis: "Emergence of fat-tailed distributions in multi-agent systems"
- Jul 19 Marilina Barulli
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis: "Boltzmann-type models for vehicular traffic with application to driver-assist vehicles"
- Jul 19 Simone Martone
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis: "Opinion dynamics: kinetic modelling and Monte Carlo simulations"
- Oct 18 Davide Cividino
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis: "A Boltzmann-type kinetic model of Alzheimer's disease"
- Oct 18 Simona Cucchiara
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis: "Kinetic models for multi-agent systems with application to vehicular traffic"

- Oct 18 Nicolò Perello
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis: "Stability and bifurcations in models of population dynamics"
- Sep 18 Sara Cavaglion
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis: "SIS and SIR epidemiological models"
- Sep 18 Giulia Formica
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis: "Fokker-Planck models for social phenomena"
- Mar 18 Matteo Marino
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis: "The Cucker-Smale model and its mean-field limit"
- Sep 17 Julien Genovese
BSc Mathematics for Engineering, Politecnico di Torino, Italy
Thesis: "Conservation laws for vehicular traffic"
- Mar 11 Riccardo Ferrero
BSc Mathematics for Engineering Sciences, Politecnico di Torino, Italy
Thesis: "Maximum principles and overdetermined elliptic problems"
Co-supervised with Prof. Enrico Serra
- Mar 11 Lorenzo Pavese
BSc Mathematics for Engineering Sciences, Politecnico di Torino, Italy
Thesis: "Elements of distributional Fourier transform with application to a linear elasticity problem"
Co-supervised with Prof. Marco Codegone
- Mar 10 Annachiara Colombi
BSc Mathematics for Engineering Sciences, Politecnico di Torino, Italy
Thesis: "Modelling tumour growth by mixture theory methods"
Co-supervised with Prof. Luigi Preziosi
- Mar 10 Fabio Fanari
BSc Mathematics for Engineering Sciences, Politecnico di Torino, Italy
Thesis: "Variational methods with applications to analytical mechanics"
Co-supervised with Prof. Luigi Preziosi
- Dec 06 Miriam Pirra
BSc Mathematics for Engineering Sciences, Politecnico di Torino, Italy
Thesis: "Tumour growth models in avascular phase"
Co-supervised with Prof. Luigi Preziosi

Invited Talks

- Nov 21 Workshop "Mean-Field Models for interacting agents" (IMSI, Chicago IL, USA)
Talk: TBA
- Apr 20 Workshop "Collective Models, Control and Uncertainty Quantification for Infectious Diseases and Related Problems" (Verona, Italy – online)
Talk: "Some (very) preliminary ideas for models of epidemic spreading in an urban mobility context"
- Feb 20 Workshop on "Kinetic Traffic Models and Numerical Methods" ("Sapienza" University of Rome, Italy)
Talk: "Emerging topics in the kinetic theory of traffic flow"
- Jul 19 ICIAM 2019 - "International Congress on Industrial and Applied Mathematics" (Valencia, Spain)
Talk: "A kinetic approach to uncertainty damping in traffic flow via driver-assist vehicles"
- Jun 19 "The 28th Biennial Numerical Analysis Conference" (University of Strathclyde, Glasgow, Scotland)
Talk: "Kinetic models of traffic flow control via driver-assist vehicles"

- May 19 Summer school “Trails in kinetic theory: foundational aspects and numerical methods” (Hausdorff Research Institute for Mathematics, Bonn, Germany)
Talk: “Kinetic modelling of traffic flow control”
- May 19 Spring Workshop on “Computational Mathematics, Statistics and Machine Learning” (University of Pavia, Italy)
Talk: “Kinetic insights into the rise and fall of popularity on social media”
- Apr 18 Workshop “Numerical Aspects of Hyperbolic Balance Laws and Related Problems” (University of Ferrara, Italy)
Talk: “Boltzmann-type models with uncertain binary interactions”
- Nov 17 Meeting “The finite volumes schemes and traffic modeling” (Laboratoire de Mathématiques de Besançon, Besançon, France)
Talk: “Control strategies for road risk mitigation in kinetic traffic modelling”
- Oct 17 Mathematics and Applications Sussex seminars (University of Sussex, Brighton, UK)
Talk: “Kinetic and multiscale models of traffic flows”
- Sep 17 IperPV2017 – XVII Italian Meeting on Hyperbolic Equations (University of Pavia, Italy)
Plenary talk: “Kinetic and multiscale models of traffic flows”
- May 17 Warwick EPSRC Symposium on Partial Differential Equations and their Applications – “Emerging PDE models in Socio-Economic Sciences” (Mathematics Institute, University of Warwick, UK)
Talk: “Reducing complexity of multi-agent systems with symmetry breaking: an application to opinion dynamics with polls”
- Mar 17 CrossFields PDEs – “Current Topics in Kinetic Theory” (Institute of Mathematics of the Polish Academy of Sciences, Warsaw, Poland)
Talk: “Kinetic description of collision avoidance in pedestrian crowds by sidestepping”
- Feb 17 Problems in discrete dynamics - From biochemical systems to rare events, networks, clustering and related topics (Arcidosso, Italy)
Talk: “Proposal of a risk model for vehicular traffic: A Boltzmann-type kinetic approach”
- Jun 16 X Forum of Partial Differential Equations (Institute of Mathematics of the Polish Academy of Sciences, Będlewo, Poland)
Talk: “A Boltzmann-type kinetic approach to the modelling of vehicular traffic”
- Mar 16 ANCONET “Analysis and Control on Networks: trends and perspectives” (University of Padua, Italy)
Talk: “A Boltzmann-type kinetic approach to traffic flow on road networks”
- Nov 15 Applied PDEs Seminar (Imperial College London, UK)
Talk: “Multiscale models of crowd dynamics”
- Oct 15 Radon Group Seminars (RICAM, Linz, Austria)
Talk: “Multiscale models of crowd dynamics”
- Sep 15 Workshop “Mathematical Foundations of Traffic” (IPAM-UCLA, Los Angeles CA, USA)
Talk: “A Boltzmann-type kinetic approach to the modeling of vehicular traffic”
- Jun 15 MASCOT 2015 “14th Meeting on Applied Scientific Computing and Tools” (IAC-CNR, Roma, Italy)
Talk: “Individuality vs. Collectivity in Crowd Dynamics Modeling”
- Jan 15 Meiji Seminar on Nonlinear Mathematical Sciences (Meiji University, Tokyo, Japan)
Talk: “Microscopic, Macroscopic: Comparison and Multiscale Coupling”
- Jan 15 ICMMA 14 Conference “Crowd Dynamics” (Meiji University, Tokyo, Japan)
Talk: “Multiscale Modeling of Pedestrian Dynamics: Individuality vs. Collectivity”
- Oct 14 KI-Net Conference “Modeling and Control in Social Dynamics” (Rutgers University, Camden NJ, USA)
Talk: “Generalized Kinetic Equations and Stochastic Game Theory for Social Systems”
- Jul 14 SIMAI 2014 Congress (Taormina, Italy)
Plenary talk: “From individuals to collectivity: Multiscale methods for living complex systems”

- Jun 14 Biomat 2014 “Complexity and Emergence in Social and Biological Systems” (University of Granada, Spain)
Talk: “Traffic flow on networks: A fully-discrete kinetic theory approach”
- Sep 13 NumHyp2013 “Numerical Approximations of Hyperbolic Systems with Source Terms and Applications” (RWTH Aachen University, Germany)
Talk: “Multiscale methods for cell migration and organization – Modeling, analysis, and (some) numerics”
- Sep 13 INdAM Meeting “The Mathematics of Cells and Tissues” (Cortona, Italy)
Talk: “Multiscale modeling of *in vitro* cell organization and migration”
- May 13 INdAM Workshop “Mathematical Models and Methods for Planet Earth” (Roma, Italy)
Talk: “On the dynamics of social conflicts: looking for the Black Swan”
- Sep 10 Workshop “Partial Differential Equations in Mathematical Biology” (Institute of Mathematics of the Polish Academy of Sciences, Będlewo, Poland)
Talk: “Initial/boundary-value problems of tumor growth in mixture theory”
- Jul 09 BIRS Workshop “Multiscale Analysis of Self-Organization in Biology” (Banff, Alberta, Canada)
Talk: “Tumor growth by a mixture theory approach: modeling and analytical issues”

Contributed Talks

- May 21 Conference “The Legacy of Carlo Cercignani: from Kinetic Theory to Turbulence Modeling” (Milano, Italy – online)
Talk: “Non-conservative viral load-based kinetic description of epidemic spread on networks”
- Sep 19 21st Congress of the Italian Mathematical Union (UMI) (Pavia, Italy)
Talk: “Kinetic models in the mathematical theory of vehicular traffic”
- Oct 18 Conference “Kinetic and transport equations: mathematical advances and applications” (Parma, Italy)
Talk: “Kinetic insights into the rise and fall of popularity on social media”
- Jun 18 15th IFAC Symposium on Control in Transportation Systems (CTS 2018, Savona, Italy)
Talk: “Control strategies for road risk mitigation in kinetic traffic modelling”

Visits

- Oct 17 University of Sussex
Brighton, UK
Dr. Bertram Düring
- Nov 15 Imperial College London
London, UK
Prof. José Antonio Carrillo de la Plata, Prof. Pierre Degond
- Oct 15 Johann Radon Institute for Computational and Applied Mathematics (RICAM)
Linz, Austria
Dr. Marie-Therese Wolfram
- Jul 15 University of Ferrara
Ferrara, Italy
Prof. Lorenzo Pareschi
- Dec 11 Eindhoven University of Technology (TU/e)
Eindhoven, the Netherlands
Dr. Adrian Muntean, Prof. Federico Toschi
- Nov 10 Institute of Applied Mathematics and Mechanics
Warsaw, Poland
Prof. Mirosław Lachowicz
- Apr-May 10 Rutgers University
Camden NJ, USA
Prof. Benedetto Piccoli

Jun 07 University of Minnesota
Minneapolis MN, USA
Prof. Hans Othmer

Memberships

- 2008-present Member of INdAM-GNFM, Section 4: "Transport and diffusion problems"
2007-2009 and 2015-present Member of UMI (Italian Mathematical Union)
2008-2020 Member of SIMAI (Italian Society for Applied and Industrial Mathematics)

Teaching Activity

Holder of PhD and Advanced Courses

- 2021 "XLVI Summer School on Mathematical Physics" (Ravello, Italy)
Series of 6 lectures on "Boltzmann-Type Models of Multi-Agent Systems on Networks"
2021 "Introduction to Mean Field Games and Applications - Crowd and Social Dynamics" (IMSI, Chicago IL, USA)
Series of 2 lectures on "Kinetic and mean-field models for multi-agent systems" and "Applications to traffic models and autonomy"
2018 "Optimal Transport: Numerical Methods and Applications" (Lake Como School of Advanced Studies, Como, Italy)
Series of 4 lectures on: "Conservation laws with nonlocal flux"
2015 "Modeling and Simulation of Emerging Collective Behavior" ("Sapienza" University of Rome, Italy)
Series of 4 lectures on: "Macroscopic and kinetic models of vehicular traffic flows"
2012 "Analysis, Modeling and Simulation of Collective Dynamics from Bacteria to Crowds" (CISM, Udine, Italy)
Series of 8 lectures on: "Multiscale modeling of pedestrian motions by time-evolving measures"
2008 "Mathematical Models in Life and Social Sciences" – MathMods IP 2008 (L'Aquila, Italy)
Series of 2 lectures on: "Traffic flow: modeling and networks"

Holder of BSc Courses

- 2021-22 Equations of Mathematical Physics (Politecnico di Torino, Italy)
Mathematical Methods for Engineering (Politecnico di Torino, Italy)
2020-21 Equations of Mathematical Physics (Politecnico di Torino, Italy)
Mathematical Methods for Engineering (Politecnico di Torino, Italy)
2019-20 Rational Mechanics (Politecnico di Torino, Italy)
Mathematical Methods for Engineering (Politecnico di Torino, Italy)
2018-19 Rational Mechanics (Politecnico di Torino, Italy)
Mathematical Methods for Engineering (Politecnico di Torino, Italy)
2017-18 Rational Mechanics (Politecnico di Torino, Italy)
Mathematical Methods for Engineering (Politecnico di Torino, Italy)
2016-17 Rational Mechanics (Politecnico di Torino, Italy)
Mathematical Methods for Engineering (Politecnico di Torino, Italy)
2015-16 Mathematical Methods for Engineering (Politecnico di Torino, Italy)

Teaching Assistant at BSc and MSc Courses

- 2021-22 Transport Models and Kinetic Theory (MSc, Politecnico di Torino, Italy)
Mathematics for Artificial Intelligence (BSc, Politecnico di Torino, Italy)
2020-21 Transport Models and Kinetic Theory (MSc, Politecnico di Torino, Italy)
Mathematics for Artificial Intelligence (BSc, Politecnico di Torino, Italy)

- 2019-20 Transport Models and Kinetic Theory (MSc, Politecnico di Torino, Italy)
- 2018-19 Transport Models and Kinetic Theory (MSc, Politecnico di Torino, Italy)
- 2017-18 Transport Models and Kinetic Theory (MSc, Politecnico di Torino, Italy)
- 2016-17 Transport Models and Kinetic Theory (MSc, Politecnico di Torino, Italy)
- 2015-16 Rational Mechanics (BSc, Politecnico di Torino, Italy)
 - 2011 Mechanics of Multiphase Systems (MSc, Politecnico di Torino, Italy)
 - 2010 Mechanics of Multiphase Systems (MSc, Politecnico di Torino, Italy)
 - 2009 Mathematical Methods for Engineering (MSc, Politecnico di Torino, Italy)
 - Partial Differential Equations (BSc, Politecnico di Torino, Italy)
 - 2008 Continuum Mechanics (MSc, Politecnico di Torino, Italy)
 - 2007 Continuum Mechanics (MSc, Politecnico di Torino, Italy)
 - 2007 Functional Analysis (MSc, Politecnico di Torino, Italy)
 - Partial Differential Equations (BSc, Politecnico di Torino, Italy)
 - 2006 Mechanics of multiphase systems (MSc, Politecnico di Torino, Italy)
 - 2006 Functional Analysis (MSc, Politecnico di Torino, Italy)
 - Partial Differential Equations (BSc, Politecnico di Torino, Italy)
 - 2005 Calculus II (BSc, Politecnico di Torino, Italy)
 - 2004 Calculus II (BSc, Politecnico di Torino, Italy)

Thematic Seminar Cycles

- 2011 Complex Systems in Engineering Sciences (Politecnico di Torino, Italy)
- 2010 Mathematical Methods and Models for Complex Systems (Politecnico di Torino, Italy)

Institutional Appointments

- 2021-2023 Member of the National Commission of the National Scientific Habilitation (ASN - Abilitazione Scientifica Nazionale) for the scientific sector 01/A4 - Mathematical Physics
- Nov 2020-present Vice-coordinator of the PhD Programme in Pure and Applied Mathematics (Politecnico di Torino, University of Torino, INdAM)
- Sep 2020-present Member of the Scientific Committee of the Excellence Project, Department of Mathematical Sciences “G. L. Lagrange”, Politecnico di Torino
- 2018-present Delegate of the Boards of Teachers of Mathematical Engineering (Politecnico di Torino) for the study plans
- 2016-2017 Outside member of a search committee for the recruitment of a Full or Associate Professor with research specialty in vehicular traffic models (Department of Mathematics, University of Alabama, USA)

Publications

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- [3] R. Della Marca, N. Loy, A. Tosin. An SIR-like kinetic model tracking individuals' viral load, 2021. doi:10.13140/RG.2.2.32046.02883. Preprint.
- [2] G. Dimarco, A. Tosin, M. Zanella. Kinetic derivation of Aw-Rascle-Zhang-type traffic models with driver-assist vehicles, 2021. doi:10.13140/RG.2.2.26670.54088/1. Preprint.
- [1] N. Loy, M. Raviola, A. Tosin. Opinion polarisation in social networks, 2021. doi:10.13140/RG.2.2.11309.41449/2. Preprint.

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- [57] M. Bertsch, B. Franchi, V. Meschini, M. C. Tesi, A. Tosin. A sensitivity analysis of a mathematical model for the synergistic interplay of amyloid beta and tau on the dynamics of Alzheimer's disease. *Brain Multiphysics*, 2:100020/1–13, 2021. doi:10.1016/j.brain.2020.100020.
- [56] F. A. Chiarello, B. Piccoli, A. Tosin. Multiscale control of generic second order traffic models by driver-assist vehicles. *Multiscale Model. Simul.*, 19(2):589–611, 2021. doi:10.1137/20M1360128.

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Books

- [3] G. Puppo, A. Tosin, editors. *Mathematical Descriptions of Traffic Flow: Micro, Macro and Kinetic Models*, volume 12 of *ICIAM 2019 SEMA SIMAI Springer Series*. Springer, 2021. doi:10.1007/978-3-030-66560-9.
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- [7] M. Herty, A. Tosin, G. Visconti, M. Zanella. Reconstruction of traffic speed distributions from kinetic models with uncertainties. In G. Puppo, A. Tosin, editors, *Mathematical Descriptions of Traffic Flow: Micro, Macro and Kinetic Models*, volume 12 of *ICIAM 2019 SEMA SIMAI Springer Series*, pages 1–16. Springer, 2021. doi:10.1007/978-3-030-66560-9_1.
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- [5] G. Ajmone Marsan, N. Bellomo, M. A. Herrero, A. Tosin. From five key questions to a System Sociology theory. In J. Bissell, C. C. S. Caiado, S. Curtis, M. Goldstein, B. Straughan, editors, *Tipping Points: Modelling Social Problems and Health*, chapter 7, pages 113–129. Wiley-Interscience, 2015. doi:10.1002/9781118992005.ch7.
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Conference Papers

- [2] A. Tosin, M. Zanella. Control strategies for road risk mitigation in kinetic traffic modelling. *IFAC-PapersOnLine*, 51(9):67–72, 2018. doi:10.1016/j.ifacol.2018.07.012.
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- [10] A. Tosin, M. Zanella. La popolarità delle opinioni. Madd-Spot, June 2018.
- [9] A. Tosin. *Commedia* matematica – Logica diabolica. Maddmaths!, 2013.
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- [4] Alla radio i modelli di folla. Controradio, 2011.
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Torino, 26th October 2021