

Stefano Turzi | Curriculum vitae

Professional address

Department of Mathematics – Politecnico di Milano
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Current position

Associate Professor in Mathematical Physics

Politecnico di Milano
SC 01/A4, SSD MAT/07

from 13/11/2020

Italian academic qualification as Associate Professor

in Mathematical Physics

28/03/2017

Visiting positions

Visiting Fellow

Isaac Newton Institute for Mathematical Sciences

University of Cambridge

07/01/2013 – 19/04/2013

Visiting Academic

School of Mathematics, Invited by: Dr. D. Chillingworth

Southampton University (UK)

25/03/2012 – 21/04/2012

Former academic positions

Tenure-Track Researcher in Mathematical Physics

Politecnico di Milano

RTD-B, art. 24 comma 3-b L. 240/2010 - SC 01/A4, SSD MAT/07

13/11/2017 – 12/11/2020

Researcher in Mathematical Physics

Politecnico di Milano

RTD-A, art. 24 comma 3-a L. 240/2010 - SC 01/A4, SSD MAT/07

01/06/2013 – 12/11/2017

Researcher in Mathematical Physics

Università degli Studi e-Campus (Italy)

25/03/2010 – 31/05/2013

Post-doc Research Fellow

Politecnico di Milano

Title: *Transport phenomena in active barriers*

Coordinators: Prof. P. Biscari & Prof. A. Frezzotti

16/01/2010 – 31/03/2010

Research contract

Politecnico di Milano, funded by Saes Getters S.p.A.

Title: *Permeability in active barriers*

Coordinator: Prof. A. Frezzotti

01/07/2009 – 30/09/2009

Research Fellow in Soft Matter Theory

Southampton University (UK)

Supervisor: Prof. G. R. Luckhurst

01/03/2008 – 28/02/2009

Research contract

Politecnico di Milano

01/09/2008 – 31/12/2008

Title: *Stability of lipid membranes with nematic interaction*

Coordinator: Prof. P. Biscari

Work history

Optical Design Engineer

Cisco Systems, Optical R&D Dept.

01/03/2000 – 29/02/2004

I was mainly concerned with the design of optical amplifiers (EDFA), the theoretical study and simulation of distributed Raman amplification, and the design of algorithms for automatic network planning

S/390 System Engineer

IBM Italy

01/06/1999 – 29/02/2000

Education

European PhD in Mathematical Engineering (cum laude)

Politecnico di Milano

18/05/2007

Thesis title: *Distortion-induced effects in nematic liquid crystals*

Supervisor: Prof. P. Biscari

Degree in Electronic Engineering (MSc Equivalent)

Politecnico di Milano

08/04/1998

Thesis title: *Design, characterization and intensity noise analysis of a diode pumped Tm-Ho:YAG laser for LIDAR applications at 2.1 μm*

Supervisor: Prof. P. Laporta

Research grants and contracts

PI for 4 projects funded by the GNFM (Italian National Group for Mathematical Physics):

2016 (3300 €); 2014 (4000 €); 2008 (3000 €); 2007 (1500 €)

Contract with ACS S.r.l (Advanced Customized Solutions): 2016 (9500 €)

The contract concerns the modelling of a bistable cholesteric liquid crystal device for applications in wearable electronics and the simulation of its optical response.

Invited talks and seminars

EMMC18 - The European Mechanics of Materials Conferences

Oxford (UK)

04-06/04/2022

AIMETA 2019

Rome (Italy)

15-19/09/2019

Giornate Signorini

Arezzo (Italy)

25/01/2019

Mathematical Physics of Living Systems

Cortona (Italy)

27/08-02/09/2017

Liquid Crystal Modelling and Simulation: A Comprehensive Introduction

Erice (Italy)

14-18/07/2017

GNFM - INDAM Meeting <i>Montecatini (Italy)</i>	04-06/05/2017
Molecular Simulation and Engineering (MolSimEng 2016) <i>Politecnico di Milano</i>	30/09/2016
26th International Liquid Crystal Conference <i>Kent (OH), USA</i>	31/07-05/08/2016
Mechanics and Mathematics of (soft) Materials and Structures <i>Roma, La Sapienza</i>	08/04/2016
XXII Congresso - AIMETA <i>Genova (Italy)</i>	14-17/09/2015
The powerful continuum mechanics <i>Brescia (Italy)</i>	13-14/11/2014
7th Italian-Japanese Workshop on Liquid Crystals and 11th National SICL Meeting <i>Ravenna (Italy)</i>	07-10/07/2014
Two-day workshop on LC-flows <i>IMATI, Pavia (Italy)</i>	25/03/2014
The mathematics of cells and tissues (INDAM Meeting) <i>Cortona (Italy)</i>	01-06/09/2013
SIAM Annual Meeting 2012 (AN12) <i>Minneapolis (MN), USA</i>	10/07/2012
Seminario di Modellazione & Simulazione DIS <i>Università di Roma Tre</i>	10/11/2011
SIAM Conference on Mathematical Aspects of Materials Science <i>Philadelphia, USA</i>	11/05/2008
Ferroelectric phenomena in liquid crystals <i>Liquid Crystal Institute, Kent (OH), USA</i>	23/06/2007
Applied Mathematics Seminar <i>Mathematical Institute, Oxford University (UK)</i>	15/01/2007
Seminar <i>School of Mathematics, Southampton University (UK)</i>	17/10/2006

Teaching

o THESIS SUPERVISOR

Bachelor degree (Mathematical Eng.)

Politecnico di Milano

7 students: M. Galvani, C. Bardelli, L. Mancini, F. Palma, M. Toschi, S. Ubbiali, S. Castelnuovo

Master degree (Mathematical Eng.)

Politecnico di Milano

1 student: A. Ullo

○ TEACHER

Physics of Complex Systems

Politecnico di Milano

PhD in Physics

2020–present

Mathematical and Physical Modeling in Engineering [2]

Politecnico di Milano

Master degree in Mathematical Engineering

2020–present

Elements of Mathematics

Politecnico di Milano

Bachelor degree in Civil Architecture

2017–present

Rational Mechanics

Politecnico di Milano

Bachelor degree in Materials Engineering and Nanotechnology

2017–2020

Mathematics and Mechanics of Solids (Mathematics)

Politecnico di Milano

Master degree in Civil Architecture

2013–2017

Theoretical Mechanics

Università e-Campus

Civil and Environmental Engineering

2010–2013

○ ASSISTANT

Models and Methods for Statistical Mechanics (Lab. of Monte Carlo methods)

Politecnico di Milano

Master degree in Mathematical Engineering

2013–2017

Mathematical and Physical Modelling for Engineering [2]

Politecnico di Milano

Master degree in Mathematical Engineering

2010–2013

Theoretical and Continuum Mechanics

Politecnico di Milano, Mathematical Engineering

2009–2012

Mathematical Models and Methods

Politecnico di Milano

Business Engineering

2009

Theoretical Mechanics

Politecnico di Milano

Chemical Engineering, Materials Engineering, Civil Engineering, Aerospace Engineering

2005,2007,2009

Analytical Mechanics

Politecnico di Milano

Aerospace Engineering

2007

Calculus II

Politecnico di Milano

Electrical Engineering, Mechanical Engineering

2005–2007

Probability and Statistics

Politecnico di Milano

Electrical Engineering

2005

Scientific interests

My main scientific interests are related to the mathematical and physical aspects of soft matter theory, liquid crystals in particular. Specifically, I have dealt with:

- *Active and bio-inspired soft matter.*
- *Anisotropic non-linear viscoelasticity and nematoacustics.* Anisotropic sound propagation and inelastic response in nematic liquid crystals.
- *Phase transitions.* Fundamental aspects of Landau theory of phase transitions with applications to biaxial nematic liquid crystals.
- *Group theory and order parameters.* Group-theoretical methods for the determination of the orientational ordering tensors and the algebra of invariants.
- *Singularity theory.* Catastrophe theory application to the study of phase transitions in liquid crystals.
- *Applied mathematics.* Applications of singular perturbation theory.

Autorizzo il Politecnico di Milano a pubblicare il presente curriculum sul sito WEB di Ateneo, ai fini istituzionali e in ottemperanza al D. Lgs n. 33 del 14 marzo 2013 "Decreto trasparenza" come modificato dal D. Lgs. 97 del 2016.

Selected publications

- [1] Davide Ambrosi, Luca Deorsola, Stefano Turzi, and Marta Zoppello. *Elementary mechanics of the mitral valve*. **SIAM Journal on Applied Mathematics**, 82(1): 75–94, 2022. doi:10.1137/21M1416655
- [2] Michele Curatolo, Gaetano Napoli, Paola Nardinocchi, and Stefano Turzi. *Dehydration-induced mechanical instabilities in active elastic spherical shells*. **Proceedings of the Royal Society of London A: Mathematical, Physical and Engineering Sciences**, 477(2254): 20210243, 2021. doi:10.1098/rspa.2021.0243
- [3] Stefano S. Turzi. *Drift-diffusion transport in a randomly inhomogeneous one-dimensional medium*. **SIAM Journal on Applied Mathematics**, 81(4): 1767–1780, 2021. doi:10.1137/20M131758X
- [4] Stefano Turzi, Marta Zoppello, and Davide Ambrosi. *Equilibrium of two rods in contact under pressure*. **Quarterly Journal of Mechanics and Applied Mathematics**, 73(4): 329–346, 2020. doi:10.1093/qjmam/hbaa016
- [5] Stefano S. Turzi. *Landau-like theory for buckling phenomena and its application to the elastica hypoarealis*. **Nonlinearity**, 33(12):7114–7139, 2020. doi:10.1088/1361-6544/abafef.
- [6] Gaetano Napoli and Stefano S. Turzi. *Spontaneous helical flows in active nematics lying on a cylindrical surface*. **Physical Review E**, 101:022701, 2020. doi:10.1103/PhysRevE.101.022701.
- [7] Stefano S. Turzi. *Two-shape-tensor model for tumbling in nematic polymers and liquid crystals*. **Physical Review E**, 100:012706, 2019. doi:10.1103/PhysRevE.100.012706.
- [8] Stefano S. Turzi and F. Bisi. *Identification of low-symmetry phases in nematic liquid crystals*. **Molecular Crystals and Liquid Crystals**, 684(1):37–57, 2019. doi:10.1080/15421406.2019.1581709.
- [9] Abramo Agosti, Davide Ambrosi and Stefano Turzi. *Strain energy storage and dissipation rate in active cell mechanics*. **Physical Review E**, 97(5):052410, 2018. doi:10.1103/PhysRevE.97.052410.
- [10] Stefano S. Turzi. *Active nematic gels as active relaxing solids*. **Physical Review E**, 96(5):052603, 2017. doi:10.1103/PhysRevE.96.052603.
- [11] Stefano S. Turzi and Fulvio Bisi. *Determination of the symmetry classes of orientational ordering tensors*. **Nonlinearity**, 30(12):4277, 2017. doi:10.1088/1361-6544/aa8713.
- [12] Gaetano Napoli and Stefano Turzi. *The delamination of a growing elastic sheet with adhesion*. **Meccanica**, 52(14):3481–3487, Nov 2017. doi:10.1007/s11012-017-0618-0.
- [13] Stefano S. Turzi. *Viscoelastic nematodynamics*. **Physical Review E - Statistical, Nonlinear, and Soft Matter Physics**, 94(6):062705, 2016. doi:10.1103/PhysRevE.94.062705.
- [14] Paolo Biscari, Antonio Dicarolo, and Stefano S. Turzi. *Liquid relaxation: A new Parodi-like relation for nematic liquid crystals*. **Physical Review E - Statistical, Nonlinear, and Soft Matter Physics**, 93(5):052704, 2016. doi:10.1103/PhysRevE.93.052704.
- [15] Gaetano Napoli and Stefano S. Turzi. *Snap buckling of a confined thin elastic sheet*. **Proceedings of the Royal Society of London A: Mathematical, Physical and Engineering Sciences**, 471(2183), 2015. doi:10.1098/rspa.2015.0444.
- [16] Stefano S. Turzi. *Elastic director vibrations in nematic liquid crystals*. **European Journal of Applied Mathematics**, 26:93–107, 2015. doi:10.1017/S0956792514000345.

- [17] David R. J. Chillingworth, Reiner Lauterbach, and Stefano S. Turzi. *Molien series and low-degree invariants for a natural action of $SO(3) \wr Z_2$* . **Journal of Physics A: Mathematical and Theoretical**, 48:015203 (1–29), 2015. doi:10.1088/1751-8113/48/1/015203.
- [18] Paolo Biscari, Antonio DiCarlo, and Stefano S. Turzi. *Anisotropic wave propagation in nematic liquid crystals*. **Soft Matter**, 10:8296–8307, 2014. doi:10.1039/c4sm01067a.
- [19] Riccardo D. Pascalis, Gaetano Napoli, and Stefano S. Turzi. *Growth-induced blisters in a circular tube*. **Physica D - Nonlinear Phenomena**, 283:1–9, 2014. doi:10.1016/j.physd.2014.05.008.
- [20] Stefano S. Turzi and Tim J. Sluckin. *Symmetry adapted molecular-field theory for thermotropic biaxial nematic liquid crystals and its expansion at low temperature*. **SIAM Journal on Applied Mathematics**, 73:1139–1163, 2013. doi:10.1137/120897237.
- [21] G. R. Luckhurst, S. Naemura, T. J. Sluckin, K. S. Thomas, and S. S. Turzi. *Molecular-field-theory approach to the Landau theory of liquid crystals: Uniaxial and biaxial nematics*. **Physical Review E: Statistical, Nonlinear, and Soft Matter Physics**, 85:031705 (1–21), 2012. doi:10.1103/PhysRevE.85.031705.
- [22] Stefano S. Turzi. *On the Cartesian definition of orientational order parameters*. **Journal of Mathematical Physics**, 52:053517 (1–29), 2011. doi:10.1063/1.3589961.
- [23] G. R. Luckhurst, S. Naemura, T. J. Sluckin, T. B. T. To, and S. Turzi. *Molecular field theory for biaxial nematic liquid crystals composed of molecules with C_{2h} point group symmetry*. **Physical Review E: Statistical, Nonlinear, and Soft Matter Physics**, 84:011704 (1–13), 2011. doi:10.1103/PhysRevE.84.011704.
- [24] Livio Gibelli and Stefano Turzi. *A catastrophe-theoretic approach to tricritical points with application to liquid crystals*. **SIAM Journal on Applied Mathematics**, 70:63–76, 2009. doi:10.1137/080733759.
- [25] Gaetano Napoli and Stefano Turzi. *On the determination of nontrivial equilibrium configurations close to a bifurcation point*. **Computers & Mathematics with Applications**, 55:299–306, 2008. doi:10.1016/j.camwa.2007.04.008.
- [26] Paolo Biscari and Stefano Turzi. *Boundary-roughness effects in nematic liquid crystals*. **SIAM Journal on Applied Mathematics**, 67:447–463, 2007. doi:10.1137/060656711.
- [27] Paolo Biscari, Gaetano Napoli, and Stefano Turzi. *Bulk and surface biaxiality in nematic liquid crystals*. **Physical Review E: Statistical, Nonlinear, and Soft Matter Physics**, 74:031708 (1–7), 2006. doi:10.1103/PhysRevE.74.031708.

Other

- [28] Gaetano Napoli and Stefano Turzi. *Correction to: The delamination of a growing elastic sheet with adhesion*. **Meccanica**, 56:253, 2021. doi:10.1007/s11012-020-01278-z.
- [29] Paolo Biscari and Stefano Turzi. *Asymptotic director fields of moving defects in nematic liquid crystals*. **Bollettino dell’Unione Matematica Italiana (UMI)**, 5:81–91, 2012. URL: <http://link.springer.com/journal/40574>.
- [30] Paolo Biscari and Stefano Turzi. *Surface melting and effective anchoring in nematics*. **Proceedings in Applied Mathematics and Mechanics**, 7:1130403–1130404, 2007. doi:10.1002/pamm.200700997.
- [31] M. Tamburello, S. Turzi, and S. Vanoli. *Subband spectrum analysis for optical multiplex section protection*, 02 2007. **US Patent**. URL: https://www.lens.org/lens/patent/US_7181137_B1.