

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

WCCM-ECCOMAS 2020

Paris (France)

19-24/07/2020

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

Mathematical and Physical Modeling in Engineering [2] <i>Politecnico di Milano</i> Master degree in Mathematical Engineering	2020–present
Elements of Mathematics <i>Politecnico di Milano</i> Bachelor degree in Civil Architecture	2017–present
Rational Mechanics <i>Politecnico di Milano</i> Bachelor degree in Materials Engineering and Nanotechnology	2017–2020
Mathematics and Mechanics of Solids (Mathematics) <i>Politecnico di Milano</i> Master degree in Civil Architecture	2013–2017
Theoretical Mechanics <i>Università e-Campus</i> Civil and Environmental Engineering	2010–2013

○ ASSISTANT

Models and Methods for Statistical Mechanics (Lab. of Monte Carlo methods) <i>Politecnico di Milano</i> Master degree in Mathematical Engineering	2013–2017
Mathematical and Physical Modelling for Engineering [2] <i>Politecnico di Milano</i> Master degree in Mathematical Engineering	2010–2013
Theoretical and Continuum Mechanics <i>Politecnico di Milano, Mathematical Engineering</i>	2009–2012
Mathematical Models and Methods <i>Politecnico di Milano</i> Business Engineering	2009
Theoretical Mechanics <i>Politecnico di Milano</i> Chemical Engineering, Materials Engineering, Civil Engineering, Aerospace Engineering	2005,2007,2009
Analytical Mechanics <i>Politecnico di Milano</i> Aerospace Engineering	2007
Calculus II <i>Politecnico di Milano</i> Electrical Engineering, Mechanical Engineering	2005–2007
Probability and Statistics <i>Politecnico di Milano</i> 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] Michele Curatolo, Gaetano Napoli, Paola Nardinocchi, and Stefano Turzi. *Dehydration-induced mechanical instabilities in active elastic spherical shells*. submitted. 2021.
- [2] Davide Ambrosi, Luca Deorsola, Stefano Turzi, and Marta Zoppello. *Elementary mechanics of the mitral valve*. submitted. 2021.
- [3] Stefano S. Turzi. *Drift-diffusion transport in a randomly inhomogeneous one-dimensional medium*. submitted. 2021.
- [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.