

## PERSONAL DETAILS

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## EDUCATION

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**PhD Physics** 2006-2010

*University of Cambridge (UK)*

Thesis: *Interaction of light with photoresponsive materials*. Supervisor: Prof. Eugene M. Terentjev. Examiners: Prof. Jeremy J. Baumberg and Prof. Dirk J. Broer.

**MSc. Biological Physics** 2003-2006

*University of Parma (Italy)*

Grade 110/110 *cum laude*. Master Thesis: *Study of motion detection in the visual system of blowfly Calliphora*, supervisor Prof. Enrico Bignetti and Prof. Jianfeng Feng

**BSc. Physics** 2000-2003

*University of Parma (Italy)*

Grade 110/110 *cum laude*. Final project: *X-ray reflectivity study of myelin basic protein interacting with model membranes*. Supervisor Prof. Luigi Cristofolini.

## WORK EXPERIENCE

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**Assistant Professor** appointed in Jul 2016

*Johns Hopkins University*

I will investigate the optics of topological defects and the behavior of cells on liquid crystal elastomers

**Post-doctoral researcher** 2013-2016

*University of Pennsylvania*

I studied confined nematic and smectic liquid crystals on curved interfaces, cylindrical pores and grooves. Mentors: Prof. Randall Kamien, Kathleen Stebe and Shu Yang

**Visiting scholar** Sep-Dec 2012

*Kyoto University (Japan)*

I learned to perform computer simulations on confined liquid crystals in porous media with Monte Carlo method, in the laboratory of Prof. Takeaki Araki

**Post-doctoral researcher** 2010-2013

*University of Milan (Italy)*

I studied liquid crystals confined in porous media, for the characterization of defects and the realization of a new concept for a bistable device. Mentor: Prof. Tommaso Bellini

**Research assistant** Mar-Aug 2006

*University of Parma (Italy)*

I used surface physics techniques to study the spontaneous formation of protein films at air-liquid interface. Mentor: Prof. Luigi Cristofolini

## PUBLICATION LIST

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### Published journal articles

- 1 L. Cristofolini, M. Fontana, F. Serra, P. Riccio, O. Konovalov ‘Microstructural analysis of the effects of incorporation of myelin basic protein in phospholipid layers’ *Eur. Biophys. J.* 34, 1041 (2005)
- 2 F. Serra, E.M. Terentjev ‘Effects of viscosity and polarity on the isomerisation of azobenzene’ *Macromolecules* 41, 981 (2008)
- 3 F. Serra, E.M. Terentjev ‘Nonlinear dynamics of absorption and photobleaching of dyes’ *J. Chem. Phys.* 128, 224510 (2008)
- 4 Y. Hirota, Y. Ji, F. Serra, A. R. Tajbakhsh, E. M. Terentjev ‘Effect of crosslinking on the photonic bandgap in deformable cholesteric elastomers’ *Opt. Express* 16, 5320 (2008)
- 5 F. Serra, M. A. Matranga, Y. Ji, E. M. Terentjev ‘Single-mode laser tuning from cholesteric elastomers using a “notch” band-gap configuration’ *Opt. Express* 18, 575 (2010)
- 6 F. Serra, K. C. Vishnubhatla, M. Buscaglia, R. Cerbino, R. Osellame, G. Cerullo, T. Bellini ‘Topological defects in nematic liquid crystals confined to porous networks’ *Soft Matter* 7, 10945 (2011), *journal inside front cover*
- 7 F. Serra, M. Buscaglia, T. Bellini ‘The Emergence of Memory in Liquid Crystals’ *Mater. Today* 14, 488 (2011)
- 8 F. Serra, S. M. Eaton, R. Cerbino, M. Buscaglia, G. Cerullo, R. Osellame, T. Bellini ‘Nematic liquid crystals embedded in cubic microlattices: memory effects and bistable pixels’ *Adv. Funct. Mater.* 23, 3990 (2013), *journal back cover*
- 9 T. Araki, F. Serra, H. Tanaka ‘Defect science and engineering of liquid crystal under geometrical frustration’ *Soft Matter* 9, 8107 (2013)
- 10 F. Giavazzi, S. Crotti, A. Speciale, F. Serra, G. Zanchetta, V. Trappe, M. Buscaglia, T. Bellini, R. Cerbino ‘Viscoelasticity of nematic liquid crystals at a glance’, *Soft Matter* 10, 3938 (2014)
- 11 F. Serra, M. A. Gharbi, Y. Luo, I. B. Liu, N.D. Bade, R.D. Kamien, S. Yang, K. J. Stebe ‘Curvature-driven, one-step assembly of reconfigurable smectic liquid crystals compound eye lenses’ *Adv. Opt. Mater.* 3, 1287 (2015)
- 12 M. A. Gharbi, I. B. Liu, Y. Luo, F. Serra, N. D. Bade, H-N. Kim, Y. Xia, R.D. Kamien, S. Yang, K. J. Stebe ‘Gardening of smectics on curved landscapes’ *Langmuir* 31, 11135 (2015)
- 13 Y. Xia, F. Serra, K. J. Stebe, R. D. Kamien, S. Yang ‘Direct mapping of nematic director field at the nanoscale’ *Proc. Natl. Acad. Sci.* 112, 50 (2015)
- 14 A. Yamaguchi, G. P. Smith, Y. Yi, C. Xu, S. Biffi, F. Serra, T. Bellini, C. Zhu, N. A. Clark ‘Phases and Structures of sunset yellow and disodium cromoglycate mixtures in water’ *Phys. Rev. E* 93, 012704 (2016), *editor’s choice*
- 15 Y. Luo, F. Serra, D. A. Beller, M. A. Gharbi, N. Li, S. Yang, R. Kamien, K. J. Stebe ‘Around the corner: Colloidal assembly and wiring in groovy nematic cells’ *Phys. Rev. E* 93, 032705 (2016)
- 16 Y. Luo, F. Serra, K. J. Stebe ‘Experimental realization of the lock-and-key mechanism in liquid crystals’ *Soft Matter* 12, 6027 (2016), *journal front cover*
- 17 (Invited) F. Serra, ‘Curvature and defects in nematic liquid crystals’, DOI: 10.1080/02678292.2016.1209698 *Liq. Cryst.* (2016)

## Patent

Y. Xia, F. Serra, K. J. Stebe, R. D. Kamien, S. Yang, 'Direct Mapping of Local Director Field of Nematic Liquid Crystals at the Nanoscale', U.S. Patent Application #62/127,365

## Conference proceedings

1 K. C. Vishnubhatla, R. Osellame, G. Cerullo, F. Serra, T. Bellini 'Effect of configuration of the microchannels fabricated by femtosecond laser micromachining on topological defects in confined liquid crystals' *Proc. SPIE* 8249, 82490B (2012)

2 F. Serra, S. M. Eaton, E. Borlini, R. Cerbino, M. Buscaglia, G. Cerullo, R. Osellame, T. Bellini 'Bistability of nematic liquid crystals confined in 3D scaffold produced by two-photon polymerization.' *CLEO: Science and Innovations*, 2012

## Book Chapter

F. Serra, E. M. Terentjev 'Nonlinear absorption of light in materials with long-lived excited states', contribution to the book *Nonlinear dynamics*, In-Tech edition (2010)

## Others

F. Serra, S. Yang *News and Views* 'Liquid crystals: material defect lines', *Nat. Mater.* 15, 10 (2016)

## SEMINARS AND PRESENTATIONS

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### Invited seminars and talks

Seminar at Kent State University, Kent, USA	Nov 2016
Seminar at University of Massachusetts, Amherst, USA	Mar 2016
Seminar at San Francisco State University, San Francisco, USA	Feb 2016
Seminar at Johns Hopkins University, Baltimore, USA	Feb 2016
Seminar at Georgia Institute of Technology, Atlanta, USA	Feb 2016
Seminar at Lehigh University, Bethlehem, USA	Feb 2016
Seminar at Syracuse University, Syracuse, USA	Jan 2016
Seminar at Haverford College, Philadelphia, USA	Jan 2016
Seminar at Union College, Schenectady, USA	Jan 2016
Seminar at Lafayette College, Philadelphia, USA	Dec 2015
Workshop <i>Soft Matter Days</i> , Julich, Germany	Nov 2015
Seminar at University of Leeds, UK	Nov 2015
Seminar at University of Ljubljana, Slovenia	Nov 2015
Conference <i>Topological defect driven soft matter</i> , Rogaska, Slovenia	Sep 2013
Seminar at University of Pennsylvania, Philadelphia, USA	Jan 2013
Seminar at Tokyo University, Tokyo, Japan	Nov 2012
Seminar at Waseda University, Tokyo, Japan	Nov 2012

### Oral presentations at conferences

APS March Meeting, Baltimore, USA	Mar 2016
European conference of liquid crystals (ECLC), Manchester, UK	Sep 2015
APS March Meeting, San Antonio, USA	Mar 2015
Italian Liquid crystal society meeting, Ravenna, Italy	Jul 2014
International liquid crystal conference (ILCC), Dublin, Ireland	Jun 2014
ACS Colloids conference, Philadelphia, USA	Jun 2014
APS March Meeting, Denver, USA	Mar 2014
International liquid crystal conference (ILCC), Mainz, Germany	Sep 2012
European conference of liquid crystals (ECLC), Ljubljana, Slovenia	Feb 2011
Liquid crystals for photonics conference (LCP), Cambridge, UK	Feb 2008

## Poster presentations at International conferences

International liquid crystal conference (ILCC), Kent, USA Jul 2016  
Liquid crystals Gordon conference, Biddeford, USA Jun 2015 and Jun 2013  
Conference European Biophysical Societies Association (EBSA), Genova, Italy Jul 2009  
Conference on Luminescence and Optical Spectroscopy (ICL), Lyon, France Jul 2008

## TEACHING

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### University of Pennsylvania

Graduate student mentoring 2013-present  
I help supervising Miss Yimin Luo, a PhD student in Kathleen Stebe's group  
Guest Lecturer 2014  
I gave two guest lectures on liquid crystals for Prof. Shu Yang's class.  
Guest Lecturer 2013  
I gave two guest lectures on liquid crystals for Prof. Kathleen Stebe's class.

### University of Milan

General Physics Teaching Assistant for Natural Sciences 2012-2013  
I was the teaching assistant of Prof. Alberto Vailati. I solved example problems in class (about 80 students), marked the tests and interviewed the students in the oral exams.  
General Physics Teaching Assistant for Biotechnology 2010-2012  
I was the teaching assistant of Prof. Tommaso Bellini. I solved example problems in class (about 100 students), marked the tests and interviewed the students in the oral exams.  
General Physics Teaching Assistant for Podiatry 2012  
I was the teaching assistant of Prof. Marco Buscaglia. I solved example problems in class (about 10 students).  
Supervisor of Masters student 2012  
I co-supervised the Masters student Mr. Antonio Speciale with Dr. Roberto Cerbino.  
Guest Lecturer 2010-2013  
I gave guest lectures on optical microscopy for the class of Physical Bases of Prof. Bellini.

### University of Cambridge

Supervisor of Soft Matter and Biophysics 2008-2009  
I was a tutor of small groups of 3rd year Physics students (2-3 per group) and my duty was to help them solve problems assigned by the lecturer and discuss general problems related to the subject. The head of class was Dr. Pietro Cicuta.  
Supervisor of Thermal and Statistical Physics 2008-2009  
Like the previous entry, I supervised small group of 3rd year students. The head of class was Prof. Eugene Terentjev.  
Lab Demonstrator of Part 1B Physics 2006-2007  
I was a demonstrator in the practical class of electromagnetism for 2nd year Physics students, head of the class Dr. Richard Saunders. The experiments regarded simple electrical circuits and magnetic materials.

## **AWARDS AND GRANTS**

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### **Awards**

Best Artistic Image NBIC Nanoday @Penn, University of Pennsylvania	2014
Galla Placidia Award, Rotary Club Ravenna	2009
Munro Studentship, Queens' college, Cambridge	2009
1st year best student in Biological Physics, University of Parma	2004
1st, 2nd, 3rd year best student in Physics, University of Parma	2000-2003

### **Fellowships**

Post-doctoral fellowship from University of Milan	2010-2013
JSPS Fellowship for short-term visiting scholars, Japan	2012
CASE Award, Cambridge (for PhD funding)	2006-2009
EPRSC scholarship, UK	2006-2009

## **OUTREACH AND OTHER RESPONSIBILITIES**

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Group meeting organizer, Milan	2011-2012
I organized the weekly group meetings for the group of Prof. Tommaso Bellini.	
Journal club co-founder and organizer, Philadelphia	2014-2015
I co-founded with Dr. M. A. Gharbi the liquid crystals journal club for students and postdocs in the physics and engineering department	
Chair of career panel, Biddeford	2015
I chaired the career panel at the Liquid crystal Gordon conference, with panelists Dr. Nelson Tabyrian, Dr. Robin Selinger and Prof. David Weitz.	
Demonstrator of Polymer Physics at the Physics at work event, Cambridge	2007-2009
The event was for students of primary and middle school.	
Referee for Soft Matter, PNAS, Nature Communications, Nature Materials, Physical Review Letters, Science Advances	2011-present
Demonstrator of Liquid crystal physics at the Materials day event, Philadelphia	2015
The event, organized by the University of Pennsylvania and Drexel University, was open to the public and it was intended for primary and middle school students.	
Demonstrator of Liquid crystal physics at the Penn Nanoday, Philadelphia	2015
The event is intended for primary and middle school students.	
Author of article in University journal, Milan	2013
The article on liquid crystals defect appeared on the University of Milan journal "Sistema Universita".	
Collaborator on a project for teaching physics in Italian high school, Ravenna	2014
I helped during the creation of a hypertext on entropy in the framework of a new project 'Clilinaction' for teaching physics in English in Italian high schools.	
Press releases	2015
The work published on Advanced Optical Materials was the most downloaded AOM paper last June and was selected among the 5 top papers of 2015 in AOM. It got press coverage, from UPenn press release, with the related video, to popular science websites as phys.org, theenginner.co.uk, thescienceexplorer.com and others.	