Francesca Serra
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Physics
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Education

2010 PhD in Physics, University of Cambridge UK
2006 MSc in Biological Physics, University of Parma, Italy
2003 BSci in Physics, University of Parma, Italy

Employment

2021 - current: Associate professor, Department of Physics, Chemistry and Pharmacy, University of Southern Denmark
2017-2021: Assistant professor, Department of Physics and Astronomy, Johns Hopkins University, USA
2013-2016: Postdoc, University of Pennsylvania, USA
2010-2013: Postdoc, University of Milan, Italy

Scientific interests

My research has covered several areas of soft matter physics, but its main focus has been in liquid crystals. My research has combined practical applications of liquid crystals and fundamental study on liquid crystal properties. I study regions in liquid crystals called topological defects. In addition, I have applied my expertise to living cells, because their organization resembles that of liquid crystal molecules, and I study their interaction with topographic features such as micro-ridges and their properties as actuators in 3D.

Research outputs

Curvature and defects in nematic liquid crystals
Serra, F., 2016, In: Liquid Crystals. 43, 13-15, p. 1920-1936

Curvature-Driven, One-Step Assembly of Reconfigurable Smectic Liquid Crystal "Compound Eye" Lenses
Serra, F., Gharbi, M. A., Luo, Y., Liu, I. B., Bade, N. D., Kamien, R. D., Yang, S. & Stebe, K. J., 1. Sept 2015, In: Advanced Optical Materials. 3, 9, p. 1287-1292

Nematic liquid crystals embedded in cubic microlattices: Memory effects and bistable pixels
Serra, F., Eaton, S. M., Cerbino, R., Buscaglia, M., Cerullo, G., Osellame, R. & Bellini, T., 26. Aug 2013, In: Advanced Functional Materials. 23, 32, p. 3990-3994

The emergence of memory in liquid crystals
Serra, F., Buscaglia, M. & Bellini, T., 2011, In: Materials Today.

Topological defects of nematic liquid crystals confined in porous networks
Serra, F., Vishnubhatla, K. C., Buscaglia, M., Cerbino, R., Osellame, R., Cerullo, G. & Bellini, T., 2011, In: Soft Matter.

Single-mode laser tuning from cholesteric elastomers using a "notch" band-gap configuration
Serra, F., Matranga, M. A., Ji, Y. & Terentjev, E. M., 2010, In: Optics Express.

Effects of solvent viscosity and polarity on the isomerization of azobenzene
Serra, F. & Terentjev, E. M., 2008, In: Macromolecules.

Nonlinear dynamics of absorption and photobleaching of dyes
Serra, F. & Terentjev, E. M., 2008, In: Journal of Chemical Physics.

Projects

BioFab Bioprinting and microfabrication in Odense
Serra, F. (Project participant)
01/04/2024 → 31/03/2029

LICEO: Liquid crystal organization of living cells
Serra, F. (PI)
01/09/2021 → 31/08/2028

Plantfoods: Microscopic and rheological explorations of plant-based food products
Bonilla, J. (Project participant) & Serra, F. (Project participant)
01/11/2023 → 31/10/2024

Funding as Independent Researcher

2024- 2029 Novo Nordisk Foundation, Denmark
Infrastructure grant NNF23OC0082495
BIOFAB Bioprinting and Microfabrication in Odense

2021-2028 Novo Nordisk Foundation, Denmark
RECRUIT Grant NNF21OC0065453
LICEO - Liquid crystalline organization of living cells

2021-2024National Science Foundation USA, Division of Materials Research
Polymer networks to induce deformations and topological defects in liquid crystals, Single investigator grant 2004532

2019-2021 ACS Petroleum Research Fund, USA
Liquid crystal topological defects as self-assembled optical components, New Investigator Grant 59931-DNI10

2019-2021 Israeli-US Binational Science Foundation (co-PI Prof. H. Aharoni)
Topological defect lines and quasiparticles in smectic liquid crystals
Grant 2018380

Selected Invited Presentations

2025 German Liquid Crystal Society conference, Goettingen, Germany
2024 International Liquid Crystal conference keynote presentation, Rio de Janeiro, Brazil
2024 American Physical Society March Meeting, Minneapolis, USA
2023 International Conference in Biological Physics, Seoul, Rep. Korea
2023 Sturgeon Lecture at British Liquid Crystal Society conference, Glasgow, UK
2023 Liquid Crystal Gordon Research conference, New Hampshire, USA
2022 Nordita conference on statistical physics, Stockholm, Sweden
2021 Pioneer Symposium at Korean Physical Society, Online, Rep. Korea
2021 American Physical Society March Meeting , Online, USA

Other Responsibilities

Conference Organizer:
2025 Vice-chair Liquid Crystals Gordon Research Conference, USA
2022 Co-organizer Italian soft days, Florence Italy
2019 Co-organizer Soft Matter Workshop at IMRC, Cancun Mexico
2019 Organizer Mid-Atlantic Soft Matter Symposium, Johns Hopkins University USA

Proposal Reviewer:
Epicur seed funding
National Science Foundation USA
Luxembourg Research Council
NWO Netherlands

Journal Reviewer:
Soft Matter, Physical Review E, Physical Review Letters, Physical Review X, Nature Materials, Nature Physics, Advanced

Optical Materials, PNAS, Advanced Intelligent Discovery, Liquid Crystals and others.

Institutional Responsibilities:
2017-now: member of 13 doctoral thesis committees in USA, Denmark, Luxembourg, France
2023- now: Gender Equality Committee, University of Southern Denmark
2019-2020: Diversity and Inclusion committee, Johns Hopkins University USA
2018-2019: Graduate Admission Committee, Johns Hopkins University USA