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Postdoc Scholar

Department of Physics, University of California Santa Barbara

Zhihong You

Education

- 2019–present **Postdoc**, theoretical physics, UC Santa Barbara, USA.
- 2015–2019 **Ph.D.**, theoretical physics, Leiden University, The Netherlands.
Advisor: Dr. Luca Giomi
- 2012–2015 **M.S.**, theoretical physics, Beijing Normal University, China.
Advisor: Prof. Zhigang Zheng
- 2008–2012 **B.S.**, applied physics, Beijing University of Posts and Telecommunications, China.

Research Interest

Soft active matter and biophysics.

Research Experiences

- 2019–present **Postdoc**, *UC Santa Barbara*.
- **Pattern formation in non-reciprocally interacting systems.**
 - Nonreciprocity as a generic route to traveling states.
 - Nonreciprocity-induced inertia in active-passive mixture.
 - **Statistical mechanics of active-passive binary fluids.**
 - **Vortex phase separation in active nematics.**
 - **Defect dynamics in active nematics: a Newtonian picture for defect ‘particles’.**
- 2015–2019 **Ph.D.**, *Leiden University*.
- **Geometry and mechanics of microdomains in growing bacterial colonies.**
 - Statistical geometry of growing bacterial colonies.
 - Mechanics of growing bacterial colonies: growth-induced active stress.
 - Modeling growing bacterial colonies as active nematics.
 - **Mono-to-multilayer transition in growing bacterial colonies.**
 - Mechanical theory: the transition is both deterministic and stochastic.
 - Statistical theory: how to predict bacterial invasion to the third dimension.
 - **Confinement-induced self-organization in growing bacterial colonies.**
 - Anisotropic stress promotes global alignment in bacterial colonies under confinement.
 - Interplay among growth, cell orientation, and mechanical stress renders bacterial colonies a smart material.
 - Control bacterial growth with mechanical stress.
 - **Statistical properties of autonomous flows in 2D active nematics.**
 - Measuring active stress in a system of growing rods.

- 2012–2015 **M.S.**, *Beijing Normal University*.
- **Collective behavior of animal groups with leaders.**
 - Noise facilitates leading in animal groups with metastable states.
 - Effective leaders in animal groups: why larger groups need less portion of leaders.
 - **Order in chaos: periodic time correlation in chaotic maps.**
- 2010–2012 **B.S.**, *Beijing University of Posts and Telecommunications*.
- **Light scattering from capillary: theory and application.**

Publications

- [8] **Z. You**, D.J.G. Pearce, and L. Giomi, "Confinement-induced Self-organization in Growing Bacterial Colonies", **Sci. Adv.** 7(4), eabc8685 (2021).
- [7] **Z. You**, A. Baskaran, and M. C. Marchetti, "Nonreciprocity as a generic route to traveling states", **Proc. Natl. Acad. Sci. U.S.A.** 117(33), 19767–19772 (2020).
- [6] **Z. You**, D.J.G. Pearce, A. Sengupta, and L. Giomi, "Mono- to Multilayer Transition in Growing Bacterial Colonies", **Phys. Rev. Lett.** 123, 178001 (2019).
- [5] L.M. Lemma, S.J. Decamp, **Z. You**, L. Giomi, and Z. Dogic, "Statistical Properties of Autonomous Flows in 2D Active Nematics", **Soft Matter** 15, 3264 (2019).
- [4] **Z. You**, D.J.G. Pearce, A. Sengupta, and L. Giomi, "Geometry and Mechanics of Microdomains in Growing Bacterial Colonies", **Phys. Rev. X** 8(3), 031065 (2018).
- [3] Q. Xu, W. Tian, **Z. You**, and J. Xiao, "Multiple beam interference model for measuring parameters of a capillary", **Appl. Opt.** 54(22) 6948-6954 (2015).
- [2] **Z. You**, D. Jiang, J. Stamnes, J. Chen, and J. Xiao, "Characteristics and applications of two-dimensional light scattering by cylindrical tubes based on ray tracing", **Appl. Opt.** 51(35), 8341-8349 (2012).
- [1] **Z. You**, D. Jiang, Z. Hou, and J. Xiao, "Analysis of light scattered by a capillary to measure a liquid's index of refraction", **Am. J. Phys.** 80(8), 688-693 (2012).

Thesis

- Ph.D *Growth-induced self-organization in bacterial colonies.*
Supervisor: Dr. Luca Giomi
- M.S. *Study on Collective Behavior of Animal Groups Based on Couzin Model* (in Chinese).
Supervisor: Prof. Zhigang Zheng
- B.S. *Light Scattering from Capillary: Theory and Application* (in Chinese).
Supervisor: Prof. Daya Jiang
'Outstanding Bachelor Thesis of Beijing University of Posts and Telecommunications'

Presentations

- 2020 Nonreciprocity as a generic route to traveling states, KITP program: Symmetry, Thermodynamics and Topology in Active Matter, Santa Barbara, USA.
- 2019 Mono-to-multilayer transition in growing bacterial colonies, Physics at Veldhoven, Veldhoven, The Netherlands.
- 2018 Role of cell growth in the self-organization of bacterial colonies, DRSTP PhD Day, Utrecht, The Netherlands.
- 2018 Role of confinement in growing bacterial colonies, APS March Meeting, Boston, USA.
- 2016 Geometry and mechanics of growing bacterial colonies, APS March Meeting, Baltimore, USA.

Teaching experiences

- 2016-2018 Teaching assistance, Soft and Bio-matter Theory, Leiden University.
- 2013-2014 Teaching assistance, Elementary Physics, Beijing Normal University.

Skills

Programming and simulations.

- Software: MATLAB and MATHEMATICA.
- Language: FORTRAN and CUDA(GPU) programming.
- Simulation: Molecular dynamics simulations and continuum (hydrodynamic) simulations.

Language.

- Chinese (mother tongue)
- English (fluent).

Awards

- 2019 **Chinese Government Award for Outstanding Self-financed Students Abroad.**
- 2014 **First prize**, in the “Article Contest on the Education of College Physics Experiment”.
- 2013 **First prize**, of the “Award for Outstanding Graduate Students from Beijing Normal University”.
- 2012 **First prize**, in the “Beijing College-Physics-Experiment Contest”.

References

- M. Cristina Marchetti Department of Physics, University of California Santa Barbara, cmarchetti@ucsb.edu.
- Luca Giomi Lorentz Institute, Leiden University, giomi@lorentz.leidenuniv.nl.
- Daniel Pearce Department of Theoretical Physics, University of Geneva, daniel.pearce@unige.ch.