

Haoran Xu

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EDUCATION AND ACADEMIC APPOINTMENTS

Postdoctoral Fellow , The Chinese University of Hong Kong <i>Department of Physics</i>	<i>2020-present</i>
Ph.D. in Physics , The Chinese University of Hong Kong <i>Department of Physics; Supervisor: Yilin Wu</i>	<i>2015-2020</i>
B.S. in Physics , University of Science and Technology of China <i>Department of Physics</i>	<i>2011-2015</i>

RESEARCH INTERESTS

Biophysics; Soft matter physics; Living active matter; Microbiology

Experimental Aspects

- Self-organization and pattern formation in living active matter
- Autonomous motion in living active solids and active nematics
- Mechanical/chemical signaling and synchronization in living systems

Numerical Simulations

- Fluid dynamics with partial differential equations
- Active matter motion with Langevin equations

HONORS AND AWARDS

CN Yang Scholarship, CUHK	<i>2020</i>
Global Young Scientists Summit, Singapore	<i>2020</i>
The Shanghai Institute of Technical Physics, Exceptional Prize	<i>2014</i>
Contemporary Undergraduate Mathematical Contest in Modelling, First prize	<i>2013</i>

MENTORING

Student Mentor, Youhan Xu (Graduate, CUHK)	<i>2023 - present</i>
Student Mentor, Zheyi Wang (Graduate, CUHK)	<i>2022 - present</i>
Physics Laboratory II (Teaching Assistant)	<i>2017-2019</i>
Physics Laboratory I (Teaching Assistant)	<i>2015-2017</i>

PUBLICATIONS

A complete list of publications can also be found at [Google Scholar](#).

- [7] **Haoran Xu**, & Yilin Wu[#] (2024). "Self-enhanced mobility enables multi-scale ordering and pattern formation in living matter." *Nature*, 627, 553-558.
doi: <https://doi.org/10.1038/s41586-024-07114-8> impact factor: 64.8
- [6] **Haoran Xu**, Mehrana R Nejad, Julia Mary Yeomans, & Yilin Wu[#] (2023). "Geometrical control of interface patterning underlies active matter invasion." *Proceedings of the National Academy of Sciences* 120.30: e2219708120.
doi: <https://doi.org/10.1073/pnas.2219708120> citations: 3; impact factor: 11.1
- [5] **Haoran Xu**, Yulu Huang, Rui Zhang, & Yilin Wu[#] (2023). "Autonomous waves and global motion modes in living active solids." *Nature Physics*, 19(1), 46-51.
doi: <https://doi.org/10.1038/s41567-022-01836-0> citations: 14; impact factor: 19.6
- [4] Ye Li*, Shiqi Liu*, Yingdan Zhang, Zi Jing Seng, **Haoran Xu**, Liang Yang, & Yilin Wu[#] (2022). "Self-organized canals enable long range directed material transport in bacterial communities." *Elife* 11 e79780.
doi: <https://doi.org/10.7554/eLife.79780.sa0> citations: 4; impact factor: 8.713
- [3] Yilin Wu, & **Haoran Xu** (2021). Self-organized collective motion in bacterial communities, in Roadmap on emerging concepts in the physical biology of bacterial biofilms: from surface sensing to community formation. *Physical Biology*. 18(5):051501.
doi: [10.1088/1478-3975/abdc0e](https://doi.org/10.1088/1478-3975/abdc0e) citations: 52; impact factor: 2.959
- [2] **Haoran Xu**, Justas Dauparas, Debasish Das, Eric Lauga, & Yilin Wu[#] (2019) "Self-organization of swimmers drives long-range fluid transport in bacterial colonies." *Nature Communications*. 10, 1792.
doi: <https://doi.org/10.1038/s41467-019-09818-2> citations: 41; impact factor: 16.6
- [1] Siyu Liu*, Ye Li*, **Haoran Xu**, Daniel B. Kearns, & Yilin Wu[#] (2022). "Active bulging promotes biofilm formation in a bacterial swarm." (In Revision) *bioRxiv, Conditionally accepted by PNAS*.
doi: [10.1088/1478-3975/abdc0e](https://doi.org/10.1088/1478-3975/abdc0e) citation: 1
- * equal contribution
#corresponding author

CONFERENCES AND PRESENTATIONS

- 2024 Conference of Soft Matter and Biophysics, Shanxi, China Mar 2024
Self-enhanced mobility enables vortex pattern formation in living matter
- 2024 APS March Meeting, Minneapolis, USA Mar 2024
Multiscale ordering and vortex pattern formation in living matter
- Seminar, School of Science and Engineering, CUHK-Shenzhen, China Jan 2024
Emergent order in living active matter
- Workshop on Soft Matter and Biophysics, Songshan Lake Materials Laboratory, China Jan 2024
Autonomous waves and global motion modes in living active solids
- Seminar, Department of Physics, Zhejiang University, China Oct 2023
Self-organization of living active matter

StatPhys28 Satellite Meeting 2023, HKBU, Hong Kong <i>Active matter invasion and morphogenesis</i>	<i>Aug 2023</i>
International Workshop on Biophysics and Soft Matter, CityU, Hong Kong <i>Autonomous waves and global motion modes in living active solids</i>	<i>May 2023</i>
2023 APS March Meeting, Las Vegas, USA <i>Autonomous waves and global motion modes in living active solids</i>	<i>Mar 2023</i>
Seminar, Department of Physics, HKUST, Hong Kong <i>Collective motion of active matter in confinements</i>	<i>Oct 2020</i>
Physics Student Conference, Department of Physics, CUHK, Hong Kong <i>Collective motion of active matter in confinements</i>	<i>Sept 2020</i>
Seminar, Department of Physics, CUHK, Hong Kong <i>Collective motion in bacterial colonies</i>	<i>Jul 2020</i>
2020 APS March Meeting, Denver, USA <i>Self-organization of motile rings and long-range transport in bacterial communities</i>	<i>Mar 2020</i>
Global Young Scientists Summit, Singapore	<i>Jan 2020</i>
2018 CPS Fall Meeting, Dalian, China <i>Self-organization of motile rings and long-range transport in bacterial communities</i>	<i>Sept 2018</i>
2018 Joint Annual Conference of Physical Societies, Macau <i>Self-organization of motile rings and long-range transport in bacterial communities</i>	<i>Jul 2018</i>

POSTERS

2024 APS March Meeting, Minneapolis, USA <i>Active matter invasion and morphogenesis</i>	<i>Mar 2024</i>
New Perspectives in Active Systems, MPIPKS, Dresden, Germany <i>Geometrical control of interface patterning underlies active matter invasion</i>	<i>Apr 2023</i>
2016 APS March Meeting, Baltimore, USA <i>Collective motion in <i>Proteus mirabilis</i> swarms</i>	<i>Mar 2016</i>

TECHNICAL SKILLS AND INTERESTS

Languages: C/C++, CUDA, Python, MatLab, HTML+Markdown

Softwares: Origin, AutoCAD, Adobe Lightroom, Adobe Illustrator

Systems: Arch Linux, Arduino, Raspberry Pi