Yiqiu Zhao

Curriculum vitae

Contact Information

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Professional Experiences

3. **RGC Postdoctoral Fellow** Aug. 2023 - present
   Department of Physics
   The Hong Kong University of Science and Technology
   Advisor: Qin Xu
2. **Postdoctoral Fellow** Aug. 2021 - Aug. 2023
   Department of Physics
   The Hong Kong University of Science and Technology
   Advisor: Qin Xu
1. **Postdoctoral Fellow** Aug. 2020 - Aug. 2021
   Department of Civil and Environmental Engineering
   The Hong Kong University of Science and Technology
   Advisor: Jidong Zhao

Education

3. **PhD in Physics** Aug. 2015 - May 2020
   Department of Physics, Duke University
   Advisors: Joshua E. S. Socolar and the late Robert P. Behringer
2. **Visiting Undergraduate Student** Aug. 2013 - Jun. 2014
   Department of Physics, Duke University
1. **BSc in Physics** Sep. 2011 - Jul. 2015
   Taishan College (Honor School), Shandong University

Grants

1. The RGC Postdoctoral Fellowship Scheme, University Grants Committee of Hong Kong (2023 - 2026)
   Project: "Shear Jamming in Chiral Suspensions" ($ 1, 260, 270 HKD)

Research Field

- Experimental soft matter and complex systems physics.

Selected Awards

10. Alumnus of the 73rd Lindau Nobel Laureate Meeting. 2024
9. Honorable Mention (top 10%), FECS Postdoctoral Poster Competition, American Physical Society 2023
8. Best Talk Award, Soft Matter Day Workshop, HKUST 2022
7. Duke Graduate School Conference Travel Award (3 times), Duke University 2018 - 2019
6. Honor Student at Taishan College, Taishan College, Shandong University 2015
5. Outstanding Graduate of Shandong University, Shandong University 2015
4. Award for Studying Aboard, Taishan College, Shandong University 2014
3. Second Place, Undergraduate Poster Session, Department of Physics, Duke University 2014
2. Outstanding Student Leader, Shandong University 2013
1. Scholarship for Outstanding Undergraduate Student International Exchange Program, Chinese Scholarship Council 2013

Publications[1]

12. **Nature Materials** Nov 7:1-7 (2025) [Featured in News & Views]
    C. Xu[#], S. Wang[#], H. Wang[#], X. Liu, Z. Liu, *Yiqiu Zhao*[†], W. Hu[†], Q. Xu[†]
    "Elasticity-controlled jamming criticality in soft composite solids"
11. **Nature Communications** 15, 1691 (2024) [Editor's Highlight]
    Yiqiu Zhao, H. Hu, Y. Huang, H. Liu, C. Yan, C. Xu, R. Zhang, Y. Wang, Q. Xu.
    "Elasticity-controlled jamming criticality in soft composite solids"
10. **Physical Review X** 12, 031021 (2022)
    Yiqiu Zhao, Y. Zhao, D. Wang, H. Zheng, B. Chakraborty, and J. E. S. Socolar.
    "Ultrastable shear jammed granular material"
9. **Physical Review Letters**, 123, 158001 (2019). [Editor's Suggestion] [Featured in Physics]
    Yiqiu Zhao, J. Barés, H. Zheng, J. E. S. Socolar, and R. P. Behringer.
    "Shear jammed, fragile, and steady states in homogeneously strained granular materials"
8. **Journal of Rheology** 68, 949-958 (2024)
    H. Hu, *Yiqiu Zhao*, W. Zhao, and Q. Xu.
    "Nonmonotonic rheology and stress heterogeneity in confined granular suspensions"
7. **Frontiers in Physics** 10, 1048683 (2022)
    Yiqiu Zhao, Y. Zhao, D. Wang, H. Zheng, B. Chakraborty, and J. E. S. Socolar.
    "Microscopic reversibility and emergent elasticity in ultrastable granular systems"
6. **Granular Matter** 21, 90 (2019)
    Yiqiu Zhao, J. Barés, H. Zheng, C. S. Bester, Y. Xu, J. E. S. Socolar, and R. P. Behringer.
    "Jamming transition in non-spherical particle systems: pentagons vs. disks"
5. **New Journal of Physics**, 21, 023009 (2019)
    Yiqiu Zhao, H. Zheng, D. Wang, M. Wang, and R. P. Behringer.
    "Particle scale force sensor based on intensity gradient method in granular photoelastic experiments"
4. **Granular Matter** 21, 83 (2019)
    A. A. Zadeh, J. Barés, T. A. Brzinski, K. E. Daniels, J. Dijksman, N. Docquier, H. Everitt, J. E. Kollmer, O. Lantsoght, D. Wang, M. Workamp, *Yiqiu Zhao*, and H. Zheng
    "Enlightening force chains: a review of photoelasticimetry in granular matter"
3. **EPJ Web of Conference**, 140, 03049 (2025)
    Yiqiu Zhao, J. Barés, H. Zheng, and Joshua E. S. Socolar.
    "Dynamical heterogeneity in shear-jammed granular systems"
2. **EPJ Web of Conference**, 140, 03049 (2017)
    Yiqiu Zhao, J. Barés, H. Zheng, and R. P. Behringer.
    "Tuning strain of granular matter by basal assisted Couette shear"
1. **EPJ Web of Conferences**, 140, 06010 (2017)
    Y. Xu, J. Barés, *Yiqiu Zhao*, and R. P. Behringer.
    "Jamming transition: heptagons, pentagons, and discs".

Invited Talks

8. Fifty-minutes talk, **Long-term Workshop on Frontiers in Non-equilibrium Physics 2024**, Yukawa Institute for Theoretical Physics, Kyoto University, Japan. 2024
   "Jamming and Memory Formation in Densely-filled Soft Composites."
7. One-hour talk, **Université de Montpellier**, Montpellier, France. 2024
   "Jamming Transition in Amorphous Solid Composites."
6. One-hour talk, **Songshan Lake Materials Laboratory**, Dongguan, China. 2024
   "Shear jamming in granular and soft materials."
5. One-hour talk, **2024 International Workshop on Physics of Amorphous Matter**, Institute of Theoretical Physics, Chinese Academy of Sciences, Beijing, China. 2024
   "Jamming Transition in Amorphous Solid Composites."
4. One-hour talk, **Tongji University**, Shanghai, China. 2023
   "Shear jamming in granular and soft materials."
3. Thirty-minutes talk, **The 9th International Discussion Meeting on Relaxation in Complex Systems (9IDMRCS)**, Chiba, Japan. 2023
   "Frictional shear-jammed granular materials: mechanical stability and roles in composite materials."

[1] # denotes co-first authors and † denotes co-corresponding authors.

2. One-hour talk (Remote), **Chinese Academy of Science**, Beijing, China. 2022
"Ultrastable shear-jammed granular materials."
1. One-hour talk, **Yale University**, New Haven, CT. 2019
"Shear jammed, fragile, and steady states in homogeneously strained granular materials."

Conference Presentations

23. Contributed talk, **APS March Meeting**, Anaheim, CA. 2025
"Biopolymer-like Stress-Stiffening in Soft Composites with a Near-Jamming Filler Network"
22. Regular talk, **SES 2024 Annual Technical Meeting**, Hangzhou, China 2024
"Absorbing-State Transition and Quasi-Elastic Responses in Frictional Granular Materials"
21. Contributed talk (remote), **APS March Meeting**, Virtual. 2024
"Critical scaling of shear modulus for particle-filled soft elastomers in the jamming limit"
20. Poster, **HKUST – USTC Joint Workshop on Condensed Matter Physics**, Guangzhou, China. 2023
"Designing nonlinear mechanics of soft composite solids using shear jamming"
19. Contributed talk, **The 28th International Conference on Statistical Physics**, Tokyo, Japan. 2023
"Critical scaling of shear modulus in densely-filled, ultra-soft elastomers"
18. Contributed talk (remote), **Long Feng Science Forum of CUHK (Shenzhen)**, Virtual. 2023
"Emergent elasticity in granular and soft materials"
17. Poster (remote), **APS March Meeting**, Virtual. 2023
"Jamming-controlled shear stiffening in particle-filled soft solids"
16. Contributed talk (remote), **APS March Meeting**, Virtual. 2023
"Jamming-controlled shear stiffening in particle-filled soft solids"
15. Contributed talk (remote), **APS March Meeting**, Virtual. 2023
"Emergent elasticity in shear-jammed granular materials under cyclic shear"
14. Contributed talk, **Soft Matter Day Workshop**, Hong Kong SAR. 2022
" Jamming-controlled shear-stiffening in particle-filled soft elastomers"
13. Soundbite (remote), **7th Beijing Soft Matter Workshop** 2022
"Experimental signatures of jamming-controlled shear-stiffening in particle-filled soft elastomers"
12. Contributed talk (remote), **APS March Meeting (online)** 2021
"Elastic-plastic transition induced by small-amplitude cyclic shearing of shear-jammed granular solids"
11. Contributed talk (remote), **APS March Meeting DSOFT Virtual Session** 2020
"Shear banding transition in granular materials under uniform and boundary shear"
10. Flash presentation & Poster, **APS Annual DFD Meeting**, Seattle, WA. 2019
"Shear banding and shear jamming in homogeneously sheared granular material"
9. Contributed talk, **APS March Meeting**, Boston, MA. 2019
"Nontrivial plasticity of a shear-jammed granular system"
8. Poster, **Gordon Research Conference & Seminar on Granular Matter**, Easton, MA. 2018
"Shear band and shear jamming under novel shear profiles"
7. Contributed talk, **APS March Meeting**, Los Angeles, CA. 2018
"Shear jamming and flow with novel shear profiles"
6. Soundbite, **Triangle Soft Matter Workshop**, Chapel Hill, NC. 2017
"Experimental study of yielding transition of granular matter"
5. Poster, **Triangle Soft Matter Workshop**, Chapel Hill, NC. 2017
"The role of strain and density in the yielding transition of granular matter"
4. Contributed talk, **APS March Meeting**, New Orleans, LA. 2017
"Tuning Shear Jamming by Basal Assisted Couette Shear"
3. Contributed talk, **APS Annual DFD Meeting**, Portland, OR. 2016
"Shear jamming in highly strained granular system without shear banding"
2. Poster, **Gordon Research Conference & Seminar on Granular Matter**, Easton, MA. 2016
"Shear Jamming in highly strained system without shear band"
1. Contributed talk, **APS March meeting**, Baltimore, MD. 2016
"How does particle shape affect the near jamming properties of granular materials? Pentagons vs. disks"

Professional Activities, Services and Outreach

9. **Referee** for *Nature* (1 paper), *Journal of Rheology* (1 paper), *Physical Review E* (1 paper), *La Rivista del Nuovo Cimento* (1 paper) and *Granular Matter* (3 papers) — 2019 - present
8. **Review Editor** for *Frontiers in Soft Matter.* — 2022 - present
7. **Co-organizer** and **chair** for the mini-symposium *9.6. Structural Signature of Elasticity, Plasticity, and Fracture in Disordered Materials* at the SES 2024 Annual Technical Meeting. — 2024
6. **Chair** for session *YY02: V: Mechanics and More* at the 2023 APS Virtual March Meeting. — 2023
5. **Chair** for session *S2: Colloidal and Liquid Crystals* at the Soft Matter Day Workshop held at HKUST. — 2022
4. **Co-organizer** for the Soft Matter Day Workshop held at HKUST. — 2022
3. **Co-author** to *the Photoelastic Methods Wiki Page* (photoelasticity.net) – an open, community-curated guidance on application of photoelastic techniques. — 2019
2. **Chair** of the Graduate Student Seminar Committee, Duke Physics Graduate Student Organization, Duke University. — 2018 - 2019
1. **Judge** for Science and Engineering Fair held at the North Carolina School of Science and Mathematics, Durham, NC (2 times) — 2017 - 2019

Teaching Experiences

7. **Contributor**, Soft Matter Reading Club, Duke Soft Matter Center, Duke University — Spring 2021
   · Gave two remote 1-hour lectures on the rheology of particulate suspensions
6. **Contributor**, Introduction to Statistical Mechanics (Graduate Level), Duke University — Fall 2018
   · Gave three 1.25-hour lectures on scaling ansatz and renomalization group theory
5. **Teaching Assistant**, Nonlinar Dynamics (Graduate Level), Duke University — Spring 2017
   · Hold office hours, graded homeworks, and wrote homework solutions
4. **Teaching Assistant**, Classical Mechanics (Graduate Level), Duke University — Fall 2016
   · Hold office hours, graded homeworks, and wrote homework solutions
3. **Teaching Assistant**, Introductory Mechanics Lab (Undergraduate Level), Duke University — Spring 2016
   · Led lab sessions and graded lab reports
2. **Teaching Assistant**, General Physics I Lab (Undergraduate Level), Duke University — Fall 2015
   · Led lab sessions and graded lab reports
1. **Home Tutor**, Australian High School Chemistry and Physics — 2012 - 2013

Selected Mentering Experiences

3. Mentored summer research for HKUST undergraduate student YANG Chun Hin. — 2022
   Project: Mechanics of liquid-solid soft composite elastomer.
2. Mentored thesis research for Duke undergraduate student Nadim Marwan Atalla. — 2017
   Project: Saltation in the Presence of a Prevailing Wind (Honor Thesis).
1. Mentored research independent study for Duke visiting undergraduate student Yuyuan Xu. — 2016
   Project: Jamming transition in granular systems consisting of heptagon-shaped particles.

Technical Skills

1. Design, construct and conduct mechanical experiments.
   · CAD; 3D printing; metal/plastic processing with milling/drilling machine, bench lathe and other machine shop tools; Raspberry Pi/Arduino/Labview automation.
2. Imaging soft and complex systems using advanced techniques.
   · photoelasticimetry, traction force microscopy and confocol microscopy.
3. Digital image processing.
   · object identification, tracking and stress field reconstructions.
4. Precise contact force measurement in photoelastic granular experiments.
5. Numerical simulation and modelling.
   · Molecular Dynamics and Monte Carlo simulations.