Qiang Gao | Curriculum Vitae

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Education

The University of Texas at Austin **Austin, TX, USA**
Ph.D. in Physics *2018–2023*
Thesis: *Exotic phases in condensed matter systems: space-time crystals and moiré superlattices*.
Advisor: Prof. Qian Niu.

University of Science and Technology of China **Hefei, China**
B.Sc. in Applied Physics *2013–2017*
Thesis: *On the Efficiency and its Enhancement of the Quantum-dot based light-emitting diode (QLED)*.
Advisor: Prof. Zhenyu Zhang.

Appointments

Harvard University **Cambridge, MA, USA**
Postdoctoral Fellow *2024–present*

The University of Texas at Austin **Austin, TX, USA**
Research Assistant *2019–2023*

The University of Texas at Austin **Austin, TX, USA**
Teaching Assistant *2018–2019*

University of Science and Technology of China & Shenzhen University **China**
Research Assistant *2017–2018*

Publication Record

Published 11 peer-reviewed papers: 7 first-authored papers with one in **Physical Review X**, two in **Physical Review Letters** (with one **featured on the cover**), three in **Physical Review B**, and one in **Physical Review Research**; 1 second-authored theory paper in **Physical Review Letters** and 3 experimental collaborations that all go to Nature journal family (**Nature**, **Nature Photonics**, and **Nature Physics**).

Research Experiences and Selected Publications

Project IV: Quantum Many-body Bootstrap

Harvard University **Cambridge, MA, USA**
Project advisor: Eslam Khalaf *2024–present*

Publication: including one preprint

Qiang Gao, Zhaoyu Han, Eslam Khalaf. "Bootstrapping Flat-band Superconductors: Rigorous Lower Bounds on Superfluid Stiffness". In: (2025). arXiv: 2506.18969.

Qiang Gao, Ryan A Lanzetta, Patrick Ledwith, Jie Wang, Eslam Khalaf. "Bootstrapping the quantum hall problem". In: *Physical Review X* 15.3 (2025), p. 031034.

Project III: Exotic Phases in Moiré Materials

The University of Texas at Austin **Austin, TX, USA**
Project advisor: Eslam Khalaf *2022–2023*

Publications:

Qiang Gao, Junkai Dong, Patrick Ledwith, Daniel Parker, Eslam Khalaf. "Untwisting moiré physics: Almost ideal bands and fractional Chern insulators in periodically strained monolayer graphene". In: *Physical Review Letters* 131.9 (2023), p. 096401.

Qiang Gao, Eslam Khalaf. "Symmetry origin of lattice vibration modes in twisted multilayer graphene: Phasons versus moiré phonons". In: *Physical Review B* 106.7 (2022), p. 075420.

Project II: Dynamics and Band Topologies in Spacetime Crystals

The University of Texas at Austin **Austin, TX, USA**
Project advisor: Qian Niu *2018–2022*

Publications:

Qiang Gao, Qian Niu. "Semiclassical dynamics of electrons in a space-time crystal: Magnetization, polarization, and current response". In: *Physical Review B* 106.22 (2022), p. 224311.

Qiang Gao, Yafei Ren, Qian Niu. "DC current generation and power feature in strongly driven Floquet-Bloch systems". In: *Physical Review Research* 4.1 (2022), p. 013216.

Qiang Gao, Qian Niu. "Floquet-Bloch oscillations and intraband Zener tunneling in an oblique spacetime crystal". In: *Physical Review Letters* 127.3 (2021), p. 036401.

Project I: Enhancement of Electroluminescence in Quantum-dots

University of Science and Technology of China **Hefei, China**
Project advisor: Zhenyu Zhang *2017–2018*

Publications:

Qiang Gao, Zhi Lin, Xiaoguang Li, Zhenyu Zhang. "Spontaneous surface plasmon polariton decay of band-edge excitons in quantum dots near a metal surface". In: *Physical Review B* 103.3 (2021), p. 035416.

Huaibin Shen, **Qiang Gao**, Yanbin Zhang, Yue Lin, Qingli Lin, Zhaohan Li, Ling Chen, Zaiping Zeng, Xiaoguang Li, Yu Jia, et al. "Visible quantum dot light-emitting diodes with simultaneous high brightness and efficiency". In: *Nature Photonics* 13.3 (2019), pp. 192–197.

Talks

Seminars (Invited Talks)

08/2025: Seminar @UChicago, Chicago, IL. *Quantum Many Body Bootstrap beyond Energies.*

05/2025: Kid's Seminar @Harvard, Boston, MA. *Bootstrapping the Quantum Hall problem.*

Contributed Talks

03/2025: APS March Meeting, Anaheim, CA. *Bootstrapping the Quantum Hall problem.*

03/2023: APS March Meeting, Las Vegas, NV. *Almost ideal Chern bands in periodically strained graphene.*

03/2018: APS March Meeting, Los Angeles, CA. *Surface plasmon polariton controlled de-excitation of quantum dot.*

Skills

Languages: Mandarin Chinese (native), English

Coding: MATLAB, Mathematica, Python, LaTeX

Awards and Fellowships

2018–2023: Provost's Graduate Excellence Fellowship, The University of Texas at Austin

2017: Outstanding Undergraduate Thesis, University of Science and Technology of China

Academic Services

Active reivewer for *Physical Review Letters*, *Physical Review X*, and *Physical Review B*

Full Publication List

Peer-reviewed

[1] **Qiang Gao**, Ryan A Lanzetta, Patrick Ledwith, Jie Wang, Eslam Khalaf. "Bootstrapping the quantum hall problem". In: *Physical Review X* 15.3 (2025), p. 031034.

[2] Yanxing Li, Chuqiao Shi, Fan Zhang, Xiaohui Liu, Yuan Xue, Viet-Anh Ha, **Qiang Gao**, Chengye Dong, Yu-Chuan Lin, Luke N Holtzman, et al. "Robust supermoiré pattern in large-angle single-twist bilayers". In: *Nature Physics* (2025), pp. 1–8.

[3] Yanxing Li, Fan Zhang, Viet-Anh Ha, Yu-Chuan Lin, Chengye Dong, **Qiang Gao**, Zhida Liu, Xiaohui Liu, Sae Hee Ryu, Hyunsue Kim, et al. "Tuning commensurability in twisted van der Waals bilayers". In: *Nature* 625.7995 (2024), pp. 494–499.

[4] **Qiang Gao**, Junkai Dong, Patrick Ledwith, Daniel Parker, Eslam Khalaf. "Untwisting moiré physics: Almost ideal bands and fractional Chern insulators in periodically strained monolayer graphene". In: *Physical Review Letters* 131.9 (2023), p. 096401.

[5] **Qiang Gao**, Eslam Khalaf. "Symmetry origin of lattice vibration modes in twisted multilayer graphene: Phasons versus moiré phonons". In: *Physical Review B* 106.7 (2022), p. 075420.

[6] **Qiang Gao**, Qian Niu. "Semiclassical dynamics of electrons in a space-time crystal: Magnetization, polarization, and current response". In: *Physical Review B* 106.22 (2022), p. 224311.

[7] **Qiang Gao**, Yafei Ren, Qian Niu. "DC current generation and power feature in strongly driven Floquet-Bloch systems". In: *Physical Review Research* 4.1 (2022), p. 013216.

[8] **Qiang Gao**, Zhi Lin, Xiaoguang Li, Zhenyu Zhang. "Spontaneous surface plasmon polariton decay of band-edge excitons in quantum dots near a metal surface". In: *Physical Review B* 103.3 (2021), p. 035416.

[9] **Qiang Gao**, Qian Niu. "Floquet-Bloch oscillations and intraband Zener tunneling in an oblique spacetime crystal". In: *Physical Review Letters* 127.3 (2021), p. 036401.

[10] Yafei Ren, **Qiang Gao**, AH MacDonald, Qian Niu. "WKB estimate of bilayer graphene's magic twist angles". In: *Physical Review Letters* 126.1 (2021), p. 016404.

[11] Huaibin Shen, **Qiang Gao**, Yanbin Zhang, Yue Lin, Qingli Lin, Zhaohan Li, Ling Chen, Zaiping Zeng, Xiaoguang Li, Yu Jia, et al. "Visible quantum dot light-emitting diodes with simultaneous high brightness and efficiency". In: *Nature Photonics* 13.3 (2019), pp. 192–197.

Preprints

[12] **Qiang Gao**, Zhaoyu Han, Eslam Khalaf. "Bootstrapping Flat-band Superconductors: Rigorous Lower Bounds on Superfluid Stiffness". In: (2025). arXiv: 2506.18969.

[13] Zhaoyu Han, Jonah Herzog-Arbeitman, **Qiang Gao**, Eslam Khalaf. "Exact models of chiral flat-band superconductors". In: (2025). arXiv: 2508.21127.

[14] Zhida Liu, **Qiang Gao**, Yanxing Li, Xiaohui Liu, Fan Zhang, Dong Seob Kim, Yue Ni, Miles Mackenzie, Hamza Abudayyeh, Kenji Watanabe, et al. "Field-Tunable Valley Coupling and Localization in a Dodecagonal Semiconductor Quasicrystal". In: (2024). arXiv: 2408.02176.