Zhendong Zhang

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Education and Training

- **Stanford University** — Stanford, CA, USA
  Bloch Postdoc Fellow — *September 2022 - April 2025*

- **The University of Chicago** — Chicago, IL, USA
  Ph.D. in Physics — *September 2017 - June 2022*

- **Huazhong University of Science and Technology** — Wuhan, Hubei, China
  Bachelor of Science - Physics — *September 2013 - June 2017*

Publications

- **Transition from an atomic to a molecular Bose-Einstein condensate**
  Zhendong Zhang, Liangchao Chen, Kai-Xuan Yao, Cheng Chin, *Nature* **592**, 708–711 (2021)
  - Designed and performed the experiment
  - Analyzed the data and prepared the manuscript

- **Many-body chemical reactions in a quantum degenerate gas**
  Zhendong Zhang, Shu Nagata, Kai-Xuan Yao, Cheng Chin, *Nature Physics* **19**, 1466-1470 (2023).
  - Designed and performed the experiment
  - Developed the theoretical model, analyzed the data and prepared the manuscript

- **Pattern formation in a driven Bose-Einstein Condensate**
  Zhendong Zhang, Kai-Xuan Yao, Lei Feng, Jiazhong Hu, Cheng Chin, *Nature Physics* **16**, 652–656 (2020).
  - Designed and performed the experiment
  - Built the theoretical model, analyzed the data and prepared the manuscript

- **Domain-wall dynamics in Bose-Einstein condensates with synthetic gauge fields**
  Kai-Xuan Yao, **Zhendong Zhang**, Cheng Chin, *Nature* **602**, 68-72 (2022)
  - Contributed to useful discussions on the manuscript

- **Quantum simulation of Unruh radiation**
  Jiazhong Hu, Lei Feng, **Zhendong Zhang**, Cheng Chin, *Nature Physics* **15**, 785–789 (2019).
  - Collaborated on the experiment, data analysis and building the theoretical model
  - Contributed to writing the manuscript

- **Jet sub-structure in fireworks emission from non-uniform and rotating Bose-Einstein Condensates**
  Han Fu, **Zhendong Zhang**, Kai-Xuan Yao, Lei Feng, Jooheon Yoo, Logan W. Clark, K. Levin, Cheng Chin, *Phys. Rev. Lett.* **125**, 183003 (2020).
  - Performed the experiment and analyzed the data
  - Contributed to writing the manuscript

- **Stability and dynamics of atom-molecule superfluids near a narrow Feshbach resonance**
  Zhiqiang Wang, Ke Wang, **Zhendong Zhang**, Shu Nagata, Cheng Chin, K. Levin, arXiv: 2310.01639, under review at *Phys. Rev. A*, **110**, 013306 (2024)
  - Performed the experiment and analyzed the data
  - Contributed to writing the manuscript
- **Unambiguous nuclear spin detection using an engineered quantum sensing sequence**
  Zijun Shu, **Zhendong Zhang**, Qingyun Cao, Pengcheng Yang, Martin B. Plenio, Christoph Müller, Johannes Lang, Nikolas Tomek, Boris Naydenov, Liam P. McGuinness, Fedor Jelezko, and Jianming Cai, *Phys. Rev. A*, **96**, 051402(R) (2017).
  - Developed the theory and performed numerical simulations
  - Contributed to useful discussions on the experiment and manuscript
- **Dynamical preparation of an atomic condensate in a Hofstadter band**
  Han Fu, Andreas Glatz, Fnu Setiawan, Kai-Xuan Yao, **Zhendong Zhang**, Cheng Chin, K. Levin, *Phys. Rev. A* **105**, 043301 (2022)
  - Contributed to useful discussions on the manuscript

Research Experience

- **Lev Group, Prof. Benjamin Lev, Ginzton lab at Stanford University**
  Bloch Postdoc Fellow, 2022-2025
  - Constructed a new experimental platform of Dy quantum gases inside a high finesse multi-mode optical cavity and study the associated novel quantum many-body phase transitions.
- **Chin Group, Prof. Cheng Chin, Department of Physics at The University of Chicago**
  Research assistant, 2017-2022
  - First observed many-body chemical reaction dynamics in Cs Bose-Einstein condensates.
  - First realized the transition from an atomic Bose-Einstein condensate to a molecular Bose-Einstein condensate in a two-dimensional flat-bottomed trap.
  - Discovered pattern formation in 2D driven Bose condensates with interaction modulated at multi-frequencies.
  - First proposed and realized quantum simulation of Unruh radiation using "Bose fireworks"
  - Invented condensate wavefunction tomography using jet emission pattern from interaction modulated BEC.
- **Cai Group, Prof. Jianming Cai, School of Physics at Huazhong University of Science and Technology**
  Research assistant, 2014-2016
  - Propose a quantum sensing pulse sequence called YY8 for unambiguous single nuclear spin detection and proved it's more robust against noise than the currently widely used XY8 pulse sequence.

- **Fratalocchi Group, Prof. Andrea Fratalocchi, King Abdullah University of Science and Technology**

  Research assistant, August-December 2016

  - Studied theoretical techniques of density matrix DFT and TDDFT
  - Obtained the hot electron generation rate with the interaction potential and special geometry of metals taken into account.

Honors and Awards

- Outstanding dissertation award, *International Organization of Chinese Physicists and Astronomers* (*OCPA*) - March, 2023
- Bloch Fellowship in Quantum Science and Engineering, *Stanford University* - December, 2021
- Quantum Creators Prize, *University of Chicago* - September, 2021
- Grainger Graduate Fellowship, *University of Chicago* - May, 2021
- DAMOP Student Participation Grant Award, *APS DAMOP* - May, 2021
- Plotnick Fellowship, *University of Chicago* - December, 2020
- Yodh Prize, *University of Chicago* - May, 2020
- National Scholarship, *China* - October, 2016
- Samsung Scholarship, *Samsung company* - June, 2016
- Excellent Student Award, *China* - 2014 - 2016
- National Scholarship, *China* - October, 2015
- National Scholarship, *China* - October, 2014

Academic Experience

- 54^{th} Annual Meeting of the APS Division of Atomic, Molecular and Optical Physics, presented a talk on **Rapidity and momentum distributions of 1D dipolar quantum gases**, June 2023
- 2023 APS March Meeting, presented an invited talk on **Many-body Chemical Reactions in a Quantum Degenerate Gas**, March 2023
- 53^{th} Annual Meeting of the APS Division of Atomic, Molecular and Optical Physics, presented a talk on **Coherent reaction dynamics in quantum degenerate regime**, June 2022
- Presentation at Quantum Information Science and Engineering Seminar at University of Chicago on **Transition from an atomic to a molecular Bose-Einstein Condensate and ultracold chemistry**, October 18^{th} 2021.
- Presentation at Quantum Creators Prize Symposium at University of Chicago on **Transition from an atomic to a molecular Bose-Einstein Condensate and ultracold chemistry**, September 30^{th} 2021.
- 52^{th} Annual Meeting of the APS Division of Atomic, Molecular and Optical Physics, presented a talk on **Transition from an atomic to a molecular Bose-Einstein Condensate**, June 2021
- Seminar talk to Prof. Francesca Ferlaino's group at University of Innsbruck on **Transition from an atomic to a molecular Bose-Einstein condensate**, May 6^{th} 2021.

- 51^{th} Annual Meeting of the APS Division of Atomic, Molecular and Optical Physics, presented a talk on **Spontaneous Pattern Formation in a Driven Bose-Einstein Condensate**, June 2020
- Midwestern Cold Atom Workshop, presented a poster on **Parametric Modulation in Bose-Einstein Condensate**, October 2019
- 50^{th} Annual Meeting of the APS Division of Atomic, Molecular and Optical Physics, presented a poster on **Parametric Modulation in Bose-Einstein Condensate**, June 2019
- Midwestern Cold Atom Workshop, presented a poster on **Bose Fireworks 2.0**, September 2018
- 49^{th} Annual Meeting of the APS Division of Atomic, Molecular and Optical Physics, presented a poster on **Bose Fireworks 2.0**, June 2018

Teaching Experience

- Teaching assistant, Quantum Mechanics II, *The University of Chicago*, January - March 2021
- Teaching assistant, Electricity and Magnetism, *The University of Chicago*, December 2017 - March 2018
- Teaching assistant, Mechanics, *The University of Chicago*, October - December 2017

Outreach

- Prepared BBQ for the **Science, Mathematics And Research Training Program**, *The University of Chicago*, July 2022.
- Experimental demonstration in the **Enhanced. Science, Mathematics And Research Training Program**, *The University of Chicago*, July 2019.
- Provided lab tours in **JFI open house/Physics with a Bang**, *James Frank Institute, The University of Chicago*, December 2018 and 2019
- Led the lab session *A Bright Idea* in the **Enhanced. Science, Mathematics And Research Training Program**, *The University of Chicago*, July 2018
- Joined *Demo Alley* in **JFI open house/Physics with a Bang**, *James Frank Institute,The University of Chicago*, December 2017
- Teaching assistant for the **Brains! Workshop**, *The University of Chicago*, December 2017