Zihuai Zhang

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Current Position

University of California, Berkeley & Berkeley Lab *Nov. 2022 - Present*
Postdoctoral Scholar with Alp Sipahigil

Research Interest

Quantum information science with solid-state devices, including spin qubits, superconducting circuits, mechanical systems, and color centers. Focused on coherence engineering, noise mitigation, and device-scale integration for scalable quantum systems.

Education

Princeton University *2016 - 2022*
Ph.D. in Electrical and Computer Engineering
Advisor: Nathalie de Leon
Thesis: Engineering quantum defects in diamond for quantum networks

University of Science and Technology of China (USTC) *2012 - 2016*
B.S. in Physics with honors, School of the Gifted Young
Advisor: Chuan-Feng Li

Selected Publications

H. Song, X. Zhang, L. Komza, N. Fiaschi, Y. Xiong, Y. Zhi, S. Dhuey, A. Schwartzberg, T. Schenkel, G. Hautier, **Z.-H. Zhang**, A. Sipahigil, "Entanglement of a nuclear spin qubit register in silicon photonics", *Nature Nanotechnology* 21, 53–57 (2026)

M. Odeh, K. Godeneli, E. Li, R. Tangirala, H. Zhou, X. Zhang, **Z.-H. Zhang**, A. Sipahigil, "Non-Markovian dynamics of a superconducting qubit in a phononic bandgap", *Nature Physics* 21, 406–411 (2025)

Z.-H. Zhang*, K. Godeneli*, J. He, M. Odeh, H. Zhou, S. Meesala, A. Sipahigil, "Acceptor-induced bulk dielectric loss in superconducting circuits on silicon", *Phys. Rev. X* 14, 041022 (2024)

Z.-H. Zhang, J.A. Zuber, L.V.H. Rodgers, X. Gui, P. Stevenson, A.M. Edmonds, N. Palmer, M.L. Markham, R.J. Cava, P. Maletinsky, N.P. de Leon, "Neutral silicon vacancy centers in undoped diamond via surface control",*Phys. Rev. Lett.* 130, 166902 (2023)

S. Mukherjee*, **Z.-H. Zhang***, M.O. de Vries, D. Oblinsky, A. Stacey, B.C. Johnson, A.M. Edmonds, N. Palmer, M.L. Markham, G.D. Scholes, B.C. Gibson, P. Reineck, N.P. de Leon, "A telecom O-band emitter in diamond", *Nano Letters* 23, 7, 2557–2562 (2023)

Z.-H. Zhang, A.M. Edmonds, N. Palmer, M.L. Markham, N.P. de Leon, "Neutral silicon vacancy centers in diamond via photoactivated itinerant carriers", *Phys. Rev. Applied* 19, 034022 (2023)

Z.-H. Zhang, P. Stevenson, G. Thiering, B.C. Rose, D. Huang, A.M. Edmonds, M.L. Markham, S.A. Lyon, A. Gali, N.P. de Leon, "Optically detected magnetic resonance in neutral silicon vacancy centers in diamond via bound exciton states", *Phys. Rev. Lett.* 125, 237402 (2020)

B.C. Rose*, D. Huang*, **Z.-H. Zhang**, P. Stevenson, A.M. Tyryshkin, S. Sangtawesin, S. Srinivasan, L. Loudin, M.L. Markham, A.M. Edmonds, D.J. Twitchen, S.A. Lyon, N.P. de Leon, "Observation of an environmentally insensitive solid-state spin defect in diamond", *Science* 361, 60-63 (2018)

Z.-H. Zhang, G. Chen, X.-Y. Xu, J.-S. Tang, W.-H. Zhang, Y.-J. Han, C.-F. Li, G.-C. Guo, "Ultrasensitive biased weak measurement for longitudinal phase estimation", *Phys. Rev. A* 94, 053843 (2016)

Full Publications

S. Mukherjee, A. Li, J. Eberle, S. Karg, **Z.-H. Zhang**, M.M. Feldman, Y. Chen, M.E. Turiansky, M. Wang, Y. Limbu, T.O. Puel, Y. Shi, M.L. Markham, R.L. Patel, P. Gumann, M.E. Flatte, C.G. Van de Walle, S.A. Lyon, N.P. de Leon,"A defect in diamond with millisecond-scale spin relaxation time at room temperature", arXiv:2603.07265 (2026)

Y. Zhu, **Z.-H. Zhang**, W. Chen, M. Sakib, A. Weber-Bargioni, S. Griffin, A. Raja, A. Sipahigil, G. Hautier, "Point defects in semiconductors: friends and foes for quantum technologies", invited review, submitted to *MRS Bulletin* (2026)

H. Zhou, E. Li, K. Godeneli, **Z.-H. Zhang**, S. Jahanbani, K. Yu, M. Odeh, S. Aloni, S. Griffin, A. Sipahigil, "Observation of Interface Piezoelectricity in Superconducting Devices on Silicon", *Nature Communications* 17, 377 (2025)

S. Jahanbani, **Z.-H. Zhang**, B. Hua, K. Godeneli, B. Müllendorff, X. Zhang, H. Zhou, A. Sipahigil, "A Nanomechanical Atomic Force Qubit", arXiv:2407.15387 (2024)

A. Wood*, A. Lozovoi*, **Z.-H. Zhang**, S. Sharma, G.I. López-Morales, H. Jayakumar, N.P. de Leon, C.A. Meriles, "Room-temperature photo-chromism of silicon vacancy centers in CVD diamond", *Nano Letters* 23, 3, 1017-1022 (2023)

G. Chen, N. Aharon, Y.-N. Sun, **Z.-H. Zhang**, W.-H. Zhang, D.-Y. He, J.-S. Tang, Y. Kedem, C.-F. Li, G.-C. Guo, "Heisenberg-scaling measurement of the single-photon Kerr non-linearity using mixed states", *Nat. Commun.* 9, 93 (2018)

G. Chen, Y. Zou, W.-H. Zhang, **Z.-H. Zhang**, Z.-Q. Zhou, D.-Y. He, J.-S. Tang, B.-H. Liu, Y. Yu, G.-W. Zha, H.-Q. Ni, Z.-C. Niu, Y.-J. Han, C.-F. Li, G.-C. Guo, "Experimental demonstration of a hybrid-quantum-emitter producing individual entangled photon pairs in the telecom band", *Scientific Reports* 6, 26680 (2016)

Patents

N.P. de Leon, J. Thompson, S. Mukherjee, **Z.-H. Zhang**, S. Horvath, M. Markham, N. Palmer,"Erbium Doped Single Crystal Ddiamod", Application No. 63/561,478, Filed: March 2024. Provisional patent pending.

N.P. de Leon, B.C. Rose, D. Huang, **Z.-H. Zhang**, A.M. Tyryshkin, S. Sangtawesin, S. Srinivasan, L. Loudin, M.L. Markham, A.M. Edmonds, D.J. Twitchen, S.A. Lyon, "Synthetic engineered diamond materials with spin impurities and methods of making the same", US20200277196A1 (2025)

Teaching and Mentorship

Teaching Assistant, ELE 302 Building Real Systems, Princeton *2019*

Research mentor, for 4 undergraduate students, 2 graduate students at Berkeley, and 2 graduate students at Princeton

Honors and Awards

Early career Ph.D. award (Princeton) *2018*

Graduated with university honors (USTC, top 3%) *2016*

Outstanding undergraduate dissertation (USTC, top 3%) *2016*

Yan Jici talented program in physics (USTC) *2014 – 2016*

National scholarship (China, top 3%) *2014 – 2015*

Services

Journal reviewer

- Springer Nature: *Nature, Nature Physics, Nature Communications, npj Quantum Information, The European Physical Journal Plus*
- American Physical Society: *Physical Review X, Physical Review Letters, PRX Quantum, Physical Review Research, Physical Review Applied, Physical Review Materials, Physical Review B*
- American Chemical Society: *Nano Letters, ACS Nano, ACS Photonics*
- Optica: *Journal of the Optical Society of America B, Optics Express*
- Others: *Advanced Quantum Technologies, Thin Solid Films*

Co-organizer: Quantum gathering of Challenge Institute for Quantum Computation *2024 - Present*

Proposal reviewer: NASA

Session organizer: APS Global Physics Summit 2026 (Division of Quantum Information)

Outreach: Presented public science demonstrations at *Día de la Ciencia/Science Day*, Princeton Public Library *2017 - 2019*

Invited Talks

Berkeley Sensor & Actuator Center Spring Conference, Berkeley, CA, US *Sept. 2025*

Kavli Energy NanoScience Institute Research Seminar, Berkeley, CA, US *May 2023*

Berkeley Sensor & Actuator Center Spring Conference, Berkeley, CA, US *Apr. 2023*

Princeton-GIA Diamond Symposium, Princeton, NJ, US *Jan. 2019*

MRS Fall Meeting, Boston, MA, US *Nov. 2018*

Conference Presentations

Molecular Foundry User Meeting, Berkeley, CA, US *Aug. 2025*

APS Global Physics Summit, Anaheim, CA, US *Mar. 2025*

Quantum Phononics MURI Review, poster, Arlington, VA, US *May 2024*

APS March Meeting, Minneapolis, MN, US *Mar. 2024*

APS March Meeting, Las Vegas, NV, US *Mar. 2023*

Gordon Research Seminar and Conference, poster, Easton, MA, US *Jul. 2022*

SPIE Photonics West, virtual *Feb. 2022*

WE-Heraeus-Seminar, virtual (poster) *Aug. 2021*

De Beers Diamond Research Conference, virtual (poster) *Jul. 2021*

APS March Meeting, virtual *Mar. 2021*

Princeton Innovation, poster, Princeton, NJ, US *Nov. 2018*

NSF EFRI-ACQUIRE review meeting, poster, Washington, D.C., US *Sept. 2018*

Gordon Research Conference, poster, Easton, MA, US *Jul. 2018*