

# Zheng-Hao Liu, PhD candidate

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## Education

- 2017 –    **Ph.D. student, University of Science and Technology of China**  
CAS Key Laboratory of Quantum information.  
Doctoral advisor: Prof. Jin-Shi Xu.
- 2016      **Exchange student, University of Michigan**, Ann Arbor, MI, USA.  
College of Literature, Science and the Arts. Project advisor: Prof. Hui Deng.
- 2013 – 2017    **B.Sc., University of Science and Technology of China**, Hefei, China.  
Yan Ji-Ci Talent Program in Physics, School of Physics. GPA:3.76/4.3.

## Research Expertise

My research orientations are quantum simulation, optical quantum information processing and foundations of quantum theory. I am adept at experimental investigation of quantum physics based on photonic architecture and also have a solid theoretical background. My main research results include the observation of two quantum Cheshire cats remotely exchanging their grins [*Nature Communications* **11**, 3006 (2020)], research highlighted by *CAS Physics* (cover story), *Scientific American* (Chinese version) and *Nature India*], a simulation of topological contextuality and braiding statistics of parafermions [*PRX Quantum* **2**, 030303 (2021) (Editors' suggestion)], a photonic implementation of quantum information masking [*Phys. Rev. Lett.* **126**, 170505 (2021)], and the construction and test of a generalized Greenberger–Horne–Zeilinger paradox [*npj Quantum Information*, **7**, 66 (2021)]. As of September, 2021, I have a total citation number of 121 and an *h*-index of 6 according to [Google Scholar](#).

## Selected Publications

### Journal Articles

- 1 **Liu, Z.-H.**, Sun, K., Pachos, J. K., Yang, M., Meng, Y., Liao, Y.-W., Li, Q., Wang, J.-F., Luo, Z.-Y., He, Y.-F., Ding, G.-R., Xu, J.-S., Han, Y.-J., Li, C.-F., & Guo, G.-C. (2021). Topological contextuality and anyonic statistics of photonic-encoded parafermions. *PRX Quantum*, 2(3), 030323. <https://doi.org/10.1103/10.1103/PRXQuantum.2.030323>
- 2 **Liu, Z.-H.**, Liang, X.-B., Sun, K., Li, Q., Meng, Y., Yang, M., Li, B., Chen, J.-L., Xu, J.-S., Li, C.-F., & Guo, G.-C. (2021). Photonic implementation of quantum information masking. *Physical Review Letters*, 126(14), 140505. <https://doi.org/10.1103/PhysRevLett.126.140505>
- 3 **Liu, Z.-H.**, Pan, W.-W., Xu, X.-Y., Yang, M., Zhou, J., Luo, Z.-Y., Sun, K., Chen, J.-L., Xu, J.-S., Li, C.-F., & Guo, G.-C. (2020). Experimental exchange of grins between quantum cheshire cats. *Nature Communications*, 11, 3006. <https://doi.org/10.1038/s41467-020-16761-0>
- 4 **Liu, Z.-H.**, Zhou, J., Meng, H.-X., Yang, M., Li, Q., Meng, Y., Su, H.-Y., Chen, J.-L., Sun, K., Xu, J.-S., Li, C.-F., & Guo, G.-C. (2021). Experimental test of the Greenberger–Horne–Zeilinger-type

paradoxes in and beyond graph states. *npj Quantum Information*, 7(1), 66. <https://doi.org/10.1038/s41534-021-00397-z>

- 5 **Liu, Z.-H.**, Meng, H.-X., Xu, Z.-P., Zhou, J., Ye, S., Li, Q., Sun, K., Su, H.-Y., Cabello, A., Chen, J.-L. et al. (2019). Experimental observation of quantum contextuality beyond Bell nonlocality. *Physical Review A*, 100(4), 042118. <https://doi.org/10.1103/PhysRevA.100.042118>
- 6 Yang, M., **Liu, Z.-H.**, Cheng, Z.-D., Xu, J.-S., Li, C.-F., & Guo, G.-C. (2019). Deep hybrid scattering image learning [co-first author]. *Journal of Physics D: Applied Physics*, 52(11), 115105. <https://doi.org/10.1088/1361-6463/aafa3c>
- 7 Wang, J.-F., **Liu, Z.-H.**, Yan, F.-F., Li, Q., Yang, X.-G., Guo, L., Zhou, X., Huang, W., Xu, J.-S., Li, C.-F., & Guo, G.-C. (2020). Experimental optical properties of single nitrogen vacancy centers in silicon carbide at room temperature. *ACS Photonics*, 7(7), 1611–1616. <https://doi.org/10.1021/acsphotonics.0c00218>
- 8 Wang, J.-F., Yan, F.-F., Li, Q., **Liu, Z.-H.**, Liu, H., Guo, G.-P., Guo, L.-P., Zhou, X., Cui, J.-M., Wang, J., Zhou, Z.-Q., Xu, X.-Y., Xu, J.-S., Li, C.-F., & Guo, G.-C. (2020). Coherent control of nitrogen-vacancy center spins in silicon carbide at room temperature. *Physical Review Letters*, 124(22), 223601. <https://doi.org/10.1103/PhysRevLett.124.223601>
- 9 Yang, M., Xiao, Y., Liao, Y.-W., **Liu, Z.-H.**, Xu, X.-Y., Xu, J.-S., Li, C.-F., & Guo, G.-C. (2020). Zonal reconstruction of photonic wavefunction via momentum weak measurement. *Laser & Photonics Reviews*, 14(5), 1900251. <https://doi.org/10.1002/lpor.201900251>

## Preprints


- 1 Sun, K., **Liu, Z.-H.**, Wang, Y., Hao, Z.-Y., Xu, X.-Y., Xu, J.-S., Li, C.-F., Guo, G.-C., Castellini, A., Lami, L., Winter, A., Adesso, G., Compagno, G., & Lo Franco, R. (2021). *Experimental quantum phase discrimination enhanced by controllable indistinguishability-based coherence* [co-first author, under peer review in *Physical Review X*]. <https://arxiv.org/abs/2103.14802>
- 2 Wang, Y., Hao, Z.-Y., **Liu, Z.-H.**, Sun, K., Xu, J.-S., Li, C.-F., Guo, G.-C., Castellini, A., Bellomo, B., Compagno, G., & Lo Franco, R. (2021). *Experimental remote entanglement distribution in a photonic quantum network through multinode indistinguishability* [under review]. <https://arxiv.org/abs/2107.03999>

## Skills

Languages	Strong, comprehensive competencies for English. Certified proficiency in Japanese (JLPT N2, Dec. 2020).
Coding	Mathematica, L <sup>A</sup> T <sub>E</sub> X, C++, Python, PHP, ...
Web Dev	HTML, CSS, MySQL,
Misc.	Skilled LaTeX typesetting and publishing, Adobe Illustrator drawing, ...

## Miscellaneous

### Awards

- 2021  **Light: Science & Applications academic league** for doctoral students in optics and optical engineering, advanced to grand finals (30 people), at Changchun Institute of Optics, Fine Mechanics and Physics.

## Miscellaneous (continued)

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- 2020  Invitation to write a Review Article for *Light: Science & Applications*. [Certification](#).
- 2020  **PFUNT best oral report award**, first prize, at Nanjing University.  
PFUNT refers to the association of Peking University, Fudan University, USTC, Nanjing University and Tsinghua University—top 5 mainland China universities in physics.
- 2020  **China Aerospace Science and Technology scholarship**, first prize (¥10k), at University of Science and Technology of China.
- 2017  **Distinguished student award** at University of Science and Technology of China.

## Community Service

- 2020  **Refereeing** for *Annalen der Physik*.
- 2019  **Assistant secretary** in [Quantum Optics Science and Technology Conference](#) at Chuzhou.
- 2019  **Volunteer** in *Chinese Optical Society Conference* at Hefei.

## References

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Available upon Request