PERSONAL INFORMATION

Xinhe Jiang

Current Position: Postdoc., Institute for Quantum Optics and Quantum Information, Austrian Academy of Sciences, Austria
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EDUCATION BACKGROUND

09/2011 – 07/2016 **SCHOOL OF PHYSICS, PEKING UNIVERSITY**

- ***Ph.D.***, Majored in Condensed Matter and Material Physics — Beijing, China

08/2007 – 07/2011 **DEPARTMENT OF PHYSICS, HARBIN INSTITUTE OF TECHNOLOGY**

- ***B.Sc.,*** Majored in Optical Information Science and Technology — Harbin, Heilongjiang, China

RESEARCH EXPERIENCE

02/2021 – Present **Professor Anton Zeilinger's Group, Austrian Academy of Sciences, Austria**

- Research on quantum contextuality and Bell inequality. Quantum state generation and entanglement characterization, exploring the connection between contextuality and nonlocality using qutrit source.
- Nonlinear crystal interference using path identity. Exploring the interpretation of path information in nonlinear interferometers.

08/2016 – 09/2020 **Professor Xiao-Song Ma's Group, Nanjing University, China**

- Research on applying surface plasmon polaritons to quantum optics experiments. Realizing Quantum Teleportation Mediated by Surface Plasmon Polaritons.
- Quantum state verification: Using a polarization-entangled source to generate a two-photon entangled state and verify the quantum state using an optimal verification strategy.
- Numerical calculations on the quantum random walk of one photon, two photons and entangled photons. Theoretical study on the hidden variable models, Bell inequality, quantum correlations, no-signaling correlations, quantum non-locality and superluminal influences of the *v*-casual models.
- Quantum memory: theoretical calculation on the coupling of a two-level system and a photon.

09/2011 – 07/2016 **Professor Jun-Jie Shi's Group, Peking University, China**

- Device Applications of Full Composition and Adjustable III-nitride Semiconductor Photoelectric Functional Materials Research on the Microscopic Mechanism of the Luminescence of Defect-dominated GaN and AlN Nanowires.
- Carry out the DFT modelling and calculate the electronic structures and optical properties of semiconductors by means of first-principles computational software, such as VASP, CASTEP, etc.

09/2013 – 06/2014 **Professor Jing Lu's Group, Peking University, China**

- Conducted research on the electronic structures and surface properties of 2D materials.
- Calculate the electronic, optical and magnetic properties of Graphene and Silicene after adsorbing some metal atoms (Cu, Ag, Au, Ni, Zn, etc.) on them.
- Programming to separate the band structures of the C, Si atoms and the metal atoms. Using Fortran and Shell Script to process the data and export for plotting.

09/2010 – 06/2011 **Professor Shu-Tian Liu's Group, Harbin Institute of Technology, China**

- Research on the interference and correlation of photon orbital angular momentum freedom based on the technique of Spontaneous Parametric Down-Conversion (SPDC) (Undergraduates' Graduation Project of HIT).
- Construct the theoretical model for the density matrix. Using MATLAB to perform numerical calculations and analysis of the influence of the aperture separation and opening angle on the detection probability and entanglement measure.

ACADEMIC ACTIVITIES

- **Poster** presentation. Xinhe Jiang, Armin Hochrainer, Jaroslav Kysela, Manuel Erhard, Xuemei Gu, Ya Yu, Anton Zeilinger, "Subjective nature of path information in quantum mechanics". Helgoland 2025 – 100 Years of Quantum Mechanics. Hamburg, Helgoland, June 9-14, 2025.
- **Oral** presentation, Conference Abstract. The 3rd JiangSu Physical Society Spring Meeting-Section J: Quantum computation and quantum communication. Yangzhou, Jiangsu, May 10-12, 2019.
- **Poster** and **Oral** presentation. Xinhe Jiang, Kaiyi Qian, Peng Chen, Zhaozhong Chen, Xiaosong Ma, "Quantum teleportation of surface plasmon polariton". Nature Conference on Nanophotonics and Integrated Photonics 2018, Nanjing, November 9-11, 2018. **Best Poster Award – Second Place**.
- **Poster** presentation. Xinhe Jiang, Kaiyi Qian, Peng Chen, Xiaosong Ma, "Quantum teleportation of surface plasmon polariton". The second Integrated Light Quantum Information Technology Youth Academic Forum. Nanjing, December 1, 2018.
- **Oral** presentation. Chair "The LUM – China Academic Network 2018-Satellite workshop on quantum optics and quantum information". Nanjing, November 23, 2018.

PATENTS

- Invention Patent, "A standardized method of quantum state verification based on optimal strategy"; Inventors: Xiaosong Ma, **Xinhe Jiang**, Kun Wang, Kaiyi Qian, Liangliang Lu; Authorization number: CN111460421B; Authorization date: 21 July 2023; Patentee: Nanjing University.

SKILLS

- Expertise: Optical system design and build. Generation and detection of single and entangled photons. Automation control of electronic devices using LabVIEW and electric optic modulator (EOM). Time-tagged photon counting with coincidence logic.
- Languages: Strong reading, writing, and good speaking skills for English. Basic German reading and speaking.
- Coding: LabVIEW, Python, MATLAB, Mathematica, Julia, LaTeX, FDTD simulation …
- Academic research, writing and publishing.

RESEARCH INTERESTS

- Development of quantum information and quantum optics techniques, including entanglement generation, single-photon and entangled-photon sources, quantum state manipulation, and verification.
- Interdisciplinary research between quantum computing, information theory, and artificial intelligence.
- Exploration of the foundations of quantum physics and pursuing its application in quantum technology.

PROJECTS

- Participant, “Quantum, quasi-quantum effect and functional integrated photonic chip in artificial microstructure”, No. 2017YFA0303704, National Key Research and Development Program, China.
- Participant, “The evolution of photon states in space-time and the related applications”, No. 1169030010, National Natural Science Foundation Program, China.
- Participant, “Foundations of optical quantum information and quantum physics”, Natural Science Foundation of Jiangsu Province, No. BK20170010, China.
- Participant, “Applications of high-dimensional photonic quantum states in quantum computation, quantum simulation and quantum communication”, NSFC-BRICS, No. 61961146001, China and BRICS.
- Participant, “All-solid-state quantum repeaters”, The Fundamental Research Funds for the Central Universities, China.

PUBLICATIONS

1. **Xinhe Jiang**, Armin Hochrainer, Jaroslav Kysela, Manuel Erhard, Xuemei Gu, Ya Yu, and Anton Zeilinger, "Subjective nature of path information in quantum mechanics", *arXiv:2505.05930*.
2. Lijun Xia, Liangliang Lu, Kun Wang, **Xinhe Jiang**, Shining Zhu, and Xiaosong Ma, "Experimental optimal verification of three-dimensional entanglement on a silicon chip", *New Journal of Physics*, 24, 095002 (2022).
3. **Xinhe Jiang**, Kun Wang, Kaiyi Qian, Zhaozhong Chen, Zhiyu Chen, Liangliang Lu, Lijun Xia, Fangmin Song, Shining Zhu and Xiaosong Ma*, “Towards the standardization of quantum state verification using optimal strategies”, *npj Quantum Information* 6, 90 (2020).
4. **Xin-he Jiang**, Peng Chen, Kai-yi Qian, Zhao-zhong Chen, Shu-qi Xu, Yu-bo Xie, Shi-ning Zhu and Xiao-song Ma*, “Quantum teleportation mediated by surface plasmon polariton”, *Scientific Reports* 10, 11503 (2020).
5. Peiyu Zhang, Liangliang Lu, Fangchao Qu, **Xinhe Jiang**, Xiaodong Zheng, Yanqing Lu, Shining Zhu, and Xiao-Song Ma, “High-quality quantum process tomography of time-bin qubit’s transmission over a metropolitan fiber network and its application”, *Chinese Optics Letters* 18(8), 082701 (2020).
6. **Xin-he Jiang**, Jun-jie Shi*, Min Zhang, Hong-xia Zhong, Pu Huang, Yi-min Ding, Xiong Cao, and Meng Wu, “Modulation of electronic and optical properties of ZnO by inserting an ultrathin ZnX (X = S, Se and Te) layer to form short-period (ZnO)m/(ZnX)n (m > n) superlattice”, *J. Alloys Compd.* 711, 581-591 (2017).
7. **Xin-he Jiang**, Jun-jie Shi*, Min Zhang, Hong-xia Zhong, Pu Huang, Yi-min Ding, Meng Wu, Xiong Cao, Xin Rong, and Xinqiang Wang, “Improvement of p-type conductivity in Al-rich AlGaN substituted by MgGa δ-doping (AlN)m/(GaN)n (m≥n) superlattice”, *J. Alloys Compd.* 686, 484-488 (2016).
8. **Xin-he Jiang**, Jun-jie Shi*, Min Zhang, Hong-xia Zhong, Pu Huang, Yi-min Ding, Xiong Cao, Meng Wu, and Zhi-min Liao, “Breakthrough of the p-type doping bottleneck in ZnO by inserting an ultrathin ZnX (X=S, Se and Te) layer doped with NX or AgZn”, *J. Phys. D: Appl. Phys.* 49, 095104 (2016).

9. **Xin-he Jiang**, Jun-jie Shi*, Min Zhang, Hong-xia Zhong, Pu Huang, Yi-min Ding, Ying-ping He and Xiong Cao, “Reduction of the Mg acceptor activation energy in GaN, AlN, Al0.83Ga0.17N and MgGa δ-Doping (AlN)5/(GaN)1: the strain effect”, *J. Phys. D: Appl. Phys.* 48, 475104 (2015).
10. **Xin-he Jiang**, Jun-jie Shi*, Min Zhang, Hong-xia Zhong, Pu Huang, Yi-min Ding, Tong-jun Yu, Bo Shen, Jing Lu and Xihua Wang, “Enhancement of TE polarized light extraction efficiency in nanoscale (AlN)m/(GaN)n (m>n) superlattice substitution for Al-rich AlGaN disorder alloy: ultra-thin GaN layer modulation”, *New J. Phys.* 16, 113065 (2014).
11. Xin Rong, Xinqiang Wang, Sergey V. Ivanov, **Xinhe Jiang**, Guang Chen, Ping Wang, Weiying Wang, Chenguang He, Tao Wang, Tobias Schulz, Martin Albrecht, Valentin N. Jmerik, Alexey A. Toropov, Viacheslav V. Ratnikov, Vladimirl. Kozlovsky, Victor P. Martovitsky, Peng Jin, Fujun Xu, Xuelin Yang, Zhixin Qin, Weikun Ge, Junjie Shi, and Bo Shen, “High-Output-Power Ultraviolet Light Source from Quasi-2D GaN Quantum Structure”, *Adv. Mater.* 28, 7978-7983 (2016).
12. Pu Huang, Jun-jie Shi, Min Zhang, **Xin-he Jiang**, Hong-xia Zhong, Yi-min Ding, Xiong Cao, Meng Wu, and Jing Lu, “Anomalous Light Emission and Wide Photoluminescence Spectra in Graphene Quantum Dot: Quantum Confinement from Edge Microstructure”, *J. Phys. Chem. Lett.* 7, 2888-2892 (2016).
13. Xiong Cao, Jun-jie Shi, Min Zhang, **Xin-he Jiang**, Hong-xia Zhong, Pu Huang, Yi-min Ding, and Meng Wu, “Band Gap Opening of Graphene by Forming Heterojunctions with the 2D Carbonitrides Nitrogenated Holey Graphene, g-G3N4, and g-CN: Electric Field Effect”, *J. Phys. Chem. C* 120, 11299 (2016).
14. Yi-min Ding, Jun-jie Shi, Min Zhang, **Xin-he Jiang**, Hong-xia Zhong, Pu Huang, Meng Wu and Xiong Cao, “Improvement of n-type conductivity in hexagonal boron nitride monolayers by doping, strain and adsorption”, *RSC Advances* 6, 29190 (2016).
15. Pu Huang, Hua Zong, Jun-jie Shi, Min Zhang, **Xin-he Jiang**, Hong-xia Zhong, Yi-min Ding, Ying-ping He, Jing Lu, and Xiao-dong Hu, “Origin of 3.45 eV Emission Line and Yellow Luminescence Band in GaN Nanowires: Surface Microwireand Defect”, *ACS Nano* 9, 9276-9283 (2015).