清华大学物理系　TSINGHUA UNIVERSITY DEPARTMENT OF PHYSICS

首页　　概况　　人员　　科学研究　　本科生　　研究生　　招聘信息

教师

　　概况

　　按拼音顺序

　　按专业分类

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安徽无为县人。

2000年自新加坡国立大学获理学博士学位，导师：胡祖协（Oh Choo Hiap）

2000.10～2006.05 日本科学技术振兴机构博士后研究员。

2006.09～ 清华大学物理系教授，博士生导师，入选清华百人计划。

2007.12　　　获国家杰出青年科学基金。

2009.12　　　教育部长江学者特聘教授

教学

2007年秋季普物3（光学+量子物理）

正在指导的博士生有5名。欢迎对量子信息感兴趣的同学加入我们。我们长期生（3年）以及博士后（2年）。

研究领域

主要贡献分四个方面：

1.实用量子密码理论；

2.基於线性光学的量子信息处理方法；

B. Wang, Phys. Rev. A., July, 2005。）本理论结果已经被美国洛斯阿拉莫斯

准计量局，维也纳大学，清华-中国科技大学等实验小组独立证实。（见2007

的三篇独立实验论文。）

2005年8月就量子密码之诱骗信号方法为著名国际学术会议EQIS05 (2005，

邀请报告。于2005年7月 为第14届国际激光物理学会议作邀请报告。[14th Ir

PHYSICS WORKSHOP, (4-7, the Keihanna Plaza Hotel, Kyoto, Japan)]。于

开的QUPON/QIPC会议上作口头报告。目前，该论文的理论结论已经被国际

发表的实验证实。

(2) 提出了一种高容错率的量子密码方案。该方案将BB-84方案之容错率提高

率提高到30%。我们的方案是现有基于光子偏振方案中容错率最高的。(详细

Phys. Rev. Lett., 92, 077902 (2004)。

2. 在基于线性光学的量子信息处理方法上，我们提出了若干具有重大影响的方

(1) 量子拒错码实验方案。该方案体现了量子纠错码的基本精神，同时在量子

往方案至少需要五个量子比特，使得实验验证极为困难。我们的方案只要三个

Wang, Phys. Rev. A 69, 022320(2004) 我是唯一 作者）。本 方案已为中国科

验证实。

(2) 非后向选择的纠缠提炼方案。此方案为目前所有方案中唯一的非后向选择

方案皆为向选择方案，即，当纠缠提炼任务完成时，所有量子态都已被毁掉。

缠提炼任务完成后，可以得到真正完好的高度纠缠态。详细内容见：Xiang-E

Phys. Rev. A68 (Rapid Communication), 060302(2003)。

3. 在量子信息的数学理论方面，我们有下列主要成果：

(1) 对连续变量纠缠态理论给出重要方法与结论。一是首次将纠缠判别映入算

给出充分必要条件。二是首次证明两模压缩态在phase-damping 通道上永远

Xiang-Bin Wang，A. Tomita, and K. Matsumoto, Phys. Rev. Lett., 87, 1379

(2) 我们首次严格证明以线性光学器件经典态的操作不可能获得纠缠。我们还

操作下达纠缠性质。 (X.-B. Wang, Phys. Rev. A 66, 064304 (2002) 以及 Ph

(2002)。

4. 在容错量子计算方面，我们研究了几何位相量子计算。

我们首次提出非绝热近似下的几何位相量子计算实现方案。牛津大学小组首

量子计算实现我们去掉了绝热近似条件. Xiang-Bin Wang and K. Matsumoto,

097901(2001)。

奖励、荣誉和学术兼职

参加或主持的在研项目：杰青（2008.1-2011.12，主持），863（2008.1-20

（2007-2012，参加）

主要论著

Selected Publications:

A. Review:

1. X. B. Wang，T. Hiroshima，A. Tomita, and M. Hayashi, "Quantum Inforr

States'', Physics Reports, 448, 1(2007).

B. Research papers in Physical Review Letters or Rapid Communicatio

2. Shu-Chao Wang, Ying Li, Xiang-Bin Wang, and Leong Chuan Kwek, "Op

5. X. B. Wang, "Quantum Key Distribution with Two-Qubit Quantum Codes", Phys. Rev. Lett. , 9 077902 (2004).

6. X. B. Wang and Fan Heng, "Entanglement concentration by ordinary linear optical devices wi post-selection", Phys. Rev. A (Rapid Communication) 68, 060302 (2003).

7. X. B. Wang and K. Matsumoto Keiji, "Nonadiabatic Conditional Geometric Phase Shift with N Phys. Rev. Lett, 87, 097901 (2001).

8. X. B. Wang, K. Matsumoto, and A. Tomita, "Detecting the Inseparability and Distillability of Continuous Variable States in Fock Space", Phys. Rev. Lett., 87, 137903 (2001).

9. Q. Zhang, X. B. Wang, Y.A. Chen, W.Y. Hwang, T. Yang and J. W. Pan, "Comment on Quan Key Distribution with Blind Bases", Phys. Rev. Lett，96，078901(2006)

10. X. B. Wang, "Fault tolerant quantum key distribution protocol with collective random unitary Phys. Rev. A, Rapid Communication，73，050304(2005)

11. Q. Zhang, J. Yin, T. Y Chen, S. Lu, J. Zhang, X, Q Li, T Yang, X. B. Wang and J. W. Pan, P Rev. A, (Rapid Communication), 73, 020301(2006)

C. Research papers collaborated with students

12. Yi-Heng Zhou(postgraduate), Zong-Wen Yu(group member), and Xiang-Bin Wang, "Tighter estimation can improve the key rate of measurement-device-independent quantum key distribut more than 100%", Phys. Rev. A 89, 052325 (2014).

13. Shu-Chao Wang(postgraduate), Zong-Wen Yu(group member), Wen-Jie Zou(post graduate Xiang-Bin Wang, "Protecting quantum states from decoherence of finite temperature using wea measurement", Phys. Rev. A 89, 022318(2014).

14. Zong-Wen Yu(group member), Yi-Heng Zhou(postgraduate), and Xiang-Bin Wang, "Three-i decoy-state method for measurement-device-independent quantum key distribution", Phys. Rev 062339 (2013).

15. Nan Qiu(postgraduate) and Xiang-Bin Wang, "Fast creation of entanglement by interaction common bath", Phys. Rev. A 88, 062332 (2013).

16. Xiang-Bin Wang, Zong-Wen Yu(group member), Jia-Zhong Hu(undergraduate), Adam Mira and Franco Nori, ".Efficient tomography of quantum-optical Gaussian processes probed with a f coherent states", Phys. Rev. A 88, 022101(2013)

17. Xiao-Xiao Zhang(undergraduate), Yu-Xiang Yang(undergraduate), and Xiang-Bin Wang, "L quantum-optical metrology with squeezed states", Phys. Rev. A 88, 013838(2013).

18. Tian Chen(postgraduate), Xiang-Bin Wang, and Jie Ren, "Dynamic control of quantum geor heat flux in a nonequilibrium spin-boson model ", Phys. Rev. B 87, 144303(2013)

19. Xiang-Bin Wang, "Three-intensity decoy-state method for device-independent quantum key distribution with basis-dependent errors", Phys. Rev. A 87, 012320 (2013)

20. Huan-Hang Chi(undergraduate), Zong-Wen Yu, and Xiang-Bin Wang，"Decoy-state meth quantum key distribution with both source errors and statistics fluctuations"，Phys. Rev. A 86, ((2012)

21. Nan Qiu(Postgraduate), Shu-chao Wang(Postgraduate), Leong Chuan Kwek, and Xiang-Bi Wang，"Preparation and entanglement purification through two-step measurements"，Phys. Re 86, 012313 (2012)

22. Li-gong Zhou(Postgraduate), Ming Gao (Postgraduate), Jin-lin Peng, and Xiang-bin Wang，

25. Gao M.(Postgraduate), Liu YX and Wang XB, "Coupling Rydberg atoms to superconducting via nanomechanical resonator", Phys. Rev. A, 83, 022309 (2011)

26. Jia-Zhong Hu(Undergraduate), Xiang-Bin Wang, and Leong Chuan Kwek, "Protecting two-q quantum states by π-phase pulses", Phys. Rev. A 82, 062317 (2010)

27. J.Z. Hu(Undergraduate) and X. B. Wang, "Reexamination of the decoy-state quantum key distribution with an unstable source", Phys. Rev. A 82, 012331(2010)

28. Xiao-Tong Ni(postgraduate), Yu-xi Liu, L. C. Kwek, and Xiang-Bin Wang, "Exponential quad operators and evolution of bosonic systems coupled to a heat bath", Phys. Rev. A 81, 062125(2

29. Wang X B, Yang C X(postgraduate), Liu Y B，" On demand entanglement source with polarization dependent frequency shift" , Applied Physics Letters, 96, 201103(2010).

30. J. Z. Hu(Undergraduate), Z. W. Yu, X. B. Wang, "Quantum cloning machine of a state in a b Bloch sphere", Euro. Phys. J. D, 51, 381(2009)

31. Z. W. Yu(Postgraduate) , X. T. Ni, L. C. Kwek, X. B. Wang, "A unified quantum NOT gate", J A, 42, 205304(2009)

32. C.X. Yang (Postgraduate) and X.B. Wang, "Thermal equilibrium control by frequent bang-ba modulation", Phys. Rev. E 81, 051131 (2010)

33. Zhou L.G.(Postgraduate), Wei L.F., Gao M. (Postgraduate), and X.B. Wang, "Strong couplir between two distant electronic spins via a nanomechanical resonator", Phys. Rev. A 81, 042323 (2010)

34. Wang XB, Yu ZW, Hu JZ (Undergraduate), "Entanglement-distribution maximization over or sided Gaussian noisy channels", PHYSICAL REVIEW A 82，022316 (2010)

35. M. Gao(Postgraduate), L. M. Liang, C. Z. Li, and X. B. Wang, "Robust quantum repeater wit atomic ensembles against phase and polarization instability", PHYSICAL REVIEW A 79, 04230 (2009)

36. Wang XB, Yang L.(postgraduate), Peng CZ, and Pan JW, "Decoy-state quantum key distrib with both source errors and statistical fluctuations", New J. Phys, 11, 075006, 2009 (Focus artic

37. X. B. Wang, C.Z. Peng, Y. Lin (Postgraduate), and J.W. Pan, "General theory of decoy-stat quantum cryptography with source errors," Phys. Rev. A 77, 042311 (2008)

38. Q. Wang(Postgraduate), X.B. Wang, G.C. Guo, "Practical decoy-state method in quantum k distribution with a heralded single-photon source" , PHYSICAL REVIEW A 75, 012312 (2007)

39. Wang Q(Postgraduate), Wang XB, Bjork G, et al., "Improved practical decoy state method i quantum key distribution with parametric down-conversion source", Euro. Phys. Lett. , 79, 4000 (2007)

D. Physical Review A, B, D, E, Journal of Physics A, B, and others:

40. Qin Wang, Xiang-Bin Wang", Simulating of the measurement-device independent quantum distribution with phase randomized general sources", Sientific Reports, 4, 4612(2014).

41. Qin Wang and Xiang-Bin Wang, "Efficient implementation of the decoy-state measurement-independent quantum key distribution with heralded single-photon sources", Phys. Rev. A 88, 0 (2013).

42. Zhang J, Liu Y, Özdemir ? K, Re-Bing Wu, Feifei Gao, Xiang-Bin Wang, Lan Yang & Franc " Quantum internet using code division multiple access", Scientific Reports, 3 ,2211(2013).

43. X. B. Wang, "Decoy-state quantum key distribution with large random errors of light intensity

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48. X. B. Wang, "Quantum key distribution with asymmetric channel noise", Phys. Rev. A, 71, 0 (2005).

49. X. B. Wang, B. S. Shi, A. Tomita, and K. Matsumoto, "Quantum entanglement swapping wit spontaneous parametric down conversion", Phys. Rev. A 69, 014303 (2004).

50. X. B. Wang, "Quantum error-rejection code with spontaneous parametric down-conversion" Rev. A 69, 022320 (2004).

51. X. B. Wang, "Possibility of producing the event-ready two-photon polarization entangled sta normal photon detectors", Phys. Rev. A 68, 042304 (2003).

52. H. Fan, H. Imai, K. Matsumoto, and X. B. Wang, "Phase-covariant quantum cloning of qudit Phys. Rev. A 67, 022317(2003).

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56. X. B. Wang and Matsumoto Keiji, "Nonadiabatic detection of the geometric phase of the macroscopic quantum State with a symmetric SQUID", Phys. Rev. B 65, 172508 (2002).

57. H. Fan, K. Matsumoto, X. B. Wang, and M. Wadati, "Quantum cloning machines for equator qubits', Phys. Rev. A 65, 012304 (2002).

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78. L. Ma, Y. D. Zhang, J. W. Pan and X. B. Wang, "The General exponential quadratic multimo squeezed states", Mod Phys Lett A 10, 837(1995).

79. X. B. Wang, S. X. Yu and Y. D. Zhang，"Linear quantum transformation and normal produ calculation of boson exponential quadratic operators", J Phys A-Math Gen 27, 6563(1994).

办公