

**导师简介:** 法扎尔·巴德沙阿 (Fazal Badshah), 男, 博士(后), 现为湖北汽车工业学院电气与信息工程学院特聘副教授。有资深学术和研究背景, 曾在巴基斯坦工程与应用科学研究所, 英国贝尔法斯特女王大学, 伊斯兰堡康萨茨大学及华中科技大学进行研究和工



作。主要的研究方向为量子光学和量子信息。先后于中国、巴基斯坦、英国完成 3 项科研基金项目(包括国家自然科学基金第 11750110411 号), 发表高被引论文 49 篇。

**研究方向:** 量子光学、量子信息等

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**研究兴趣:** 量子光学与量子信息、超冷原子、隧道时间、超经典穿越等

**近年来主持或参与的主要科研项目:**

1、国家自然科学基金(国家自然科学基金, NSFC, Grant No. 11750110411), “通过耦合微波腔系统的能量转移和量子隧穿” 2018.9-2019.9

2、巴基斯坦高等教育委员会(HEC) (Grant No. 21-339 SRGP), “基于通过马扎尔空洞超冷原子穿越产生相位时间行为的科尔介质及外部连贯驱动场影响的检验测试” 2015.2-2016.2

**近年来发表的代表性论文:**

1. Fazal Badshah et al., “Injected coherence and phase control in the tunneling of ultra slow three-level atoms” *Ain Shams Engineering journal*, doi.org/10.1016/j.asej.2023.102315 (2023).
2. Qing He, **Fazal Badshah**, L. Li, L. Wang, S. L. Su and E. Liang “*Force sensing and cooling of the mechanical membrane in a hybrid optomechanical system*” *Phys. Rev. A*, **105**, 013503 (2022).
3. Fazal Badshah, Yuan Zhou, Abdul Basit, Zia Ullah, Xin-Ke Li, Qing He and Haibo Huang, “Effect of field distribution on the tunneling time of ultracold atoms through high-quality cavities” *Laser phys.* 32 125202 (2022).
4. Abdul Basit, Hamad Ali, **Fazal Badshah**, Xiao-Fei Yang and Guo-Qin Ge, *Non-equilibrium effects on one-norm geometric correlations and emergence of pointer basis in weak and strong coupling regimes*” *Phys. Rev. A* **104**, 042417 (2021).
5. Qing He, **Fazal Badshah**, L. Li, L. Wang, S. L. Su and E. Liang” *Transparency, Stokes, and Anti-Stokes Processes in a Multimode Quadratic Coupling System with Parametric Amplifier*” *Annalen der Physik* **533**, 2000612 (2021).
6. **Fazal Badshah**, Guo-Qin Ge, Mauro Paternostro and Shahid Qamar “*Non-resonant interactions and multipartite entanglement generation in the Dicke Lipkin-Meshkov-Glick model*” *Josa B* **37**, 949 (2020).

7. **Fazal Badshah**, Abdul Basit, Hamad Ali, Guo-Qin Ge and Shahid Qamar”*Tunneling of the ultracold atoms through a mazer cavity: Effects of the injected atomic coherence and field statistics*” Phys. Scr. **95**, 075101 (2020).
8. **Fazal Badshah**, Thamer Alharbi, Tony J. G. Apollaro and Guo-Qin Ge ”*Injected coherence in the tunneling of ultracold atoms through a two-photon mazer in the squeezed vacuum and coherent field distributions*” Journal of Optical Society of America B (JOSAB) **37**, 894 (2020).
9. **Fazal Badshah**, Abdul Basit, Hamad Ali, Qing He, Haiyang Zhang, and Guo-Qin Ge “*Controlling tunneling of ultracold three-level atoms through a two-photon mazer cavity via the atom field detuning*” Laser Physics Letters **16**, 056001 (2019).
10. **Fazal Badshah**, Abdul Basit, Hamad Ali, Qing He and Guo-Qin Ge “*Phase time for the tunneling of ultracold V-type atoms through a mazer cavity* Commun. in Theor. Physics **71**, 610 (2019).
11. Hamad Ali, Abdul Basit, **Fazal Badshah** and Guo-Qin Ge “*Quantum state transfer between nitrogen vacancy center ensembles in hybrid quantum system* Europhys. Lett. **127**, 30007 (2019).
12. Abdul Basit, Hamad Ali, Misbah Qurban, **Fazal Badshah** and Guo-Qin Ge “*Dynamics of quantum discord between two quantum*

- dots placed near a nanoring surface plasmons*” Phys. Scr. **94**, 125103 (2019).
13. **Fazal Badshah**, Abdul Basit, Hamad Ali, Haiyang Zhang, Qing He and Guo-Qin Ge “*Propagation of the probe field through a chiral medium with four-level atoms*” Laser Physics Letters **16**, 035201 (2019).
14. **Fazal Badshah**, Abdul Basit, Hamad Ali, Qing He, Haiyang Zhang, and Guo-Qin Ge “*Effects of the nonlinear interactions on the tunneling time of ultracold atom*” Eur. Phys. J. D **73**, 50 (2019).
15. Qing He, **Fazal Badshah**, Haiyang Zhang, , Young Hu and Guo-Qin Ge “*Novel transparency, absorption and amplification in a driven optomechanical system with a two-level defect*” Laser Physics Letters **16**, 035202 (2019).
16. **Fazal Badshah**, Guo-Qin Ge, Muhammad Irfan, Sajid Qamar and Shahid Qamar “*On the tunneling time of ultracold atoms through a system of two mazer cavities*” Scientific Reports **8(1)**, 1864 (2018).
17. Hu Fenglian, **Fazal Badshah**, Abdul Basit, Haiyang Zhang, He Qing and Guo-Qin Ge “*Coherent control of the Hartman effect through a photonic crystal with four-level defect layer*” Commun. in Theor. Physics **70**, 613 (2018).

18. Qing He, **Fazal Badshah**, Ra\_ Ud Din, Haiyang Zhang, Young Hu and Guo-Qin Ge “*Optomechanically induced transparency and the long-lived slow light in a nonlinear system*” Journal of Optical Society of America B (JOSAB) **35**, 001649 (2018).
19. Ra\_ Ud Din, **Fazal Badshah**, Iftikhar Ahmad and Guo-Qin Ge “*Tunable surface plasmon polaritons at the surfaces of nanocomposite media*” Europhysics Letters **122**, 17001 (2018).
20. Qing He, **Fazal Badshah**, Ra\_ Ud Din, Haiyang Zhang, Young Hu and Guo-Qin Ge “*Multiple transparency in a multimode quadratic coupling optomechanical system with an ensemble of three-level atoms*” Journal of Optical Society of America B (JOSAB) **35**, 2550 (2018).
21. Haiyang Zhang, **Fazal Badshah**, Abdul Basit and Guo-Qin Ge “*Orbital Feshbach resonance of Fermi Gases in an Optical Lattice*” J. Phys. B: At. Mol. Opt. Phys. **51**, 185301 (2018).
22. Haiyang Zhang, **Fazal Badshah**, Abdul Basit and Guo-Qin Ge “*Fermi gas of orbital Feshbach resonance in synthetic 1D + 1 dimensional optical lattice*” Laser Physics Letters **15**, 115501 (2018).
23. Abdul Basit, Hamad Ali, **Fazal Badshah**, Haiyang Zhang, Ra\_ Ud Din and Guo-Qin Ge “*Protection of the entanglement between*

*two qubits trapped in coupled cavities via cavity architecture”*

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Sajid Qamar *“Phase time delay and Hartman effect in a one-dimensional photonic crystal with four-level atomic defect layer”*

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26. **Fazal Badshah**, Abdul Basit, Hamad Ali and Guo-Qin Ge

*“Manipulating the tunneling of ultracold atoms through a mazer cavity via vacuum-multiparticle interactions”* Laser Physics Letters

**14**, 025205 (2017).

27. Abdul Basit, **Fazal Badshah**, Hamad Ali and Guo-Qin Ge

*“Protecting Quantum Discord from decoherence of depolarizing noise via weak measurement and measurement reversal”*

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28. Abdul Basit, Hamad Ali, **Fazal Badshah** and Guo-Qin Ge

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29. Abdul Basit, , Hamad Ali, **Fazal Badshah** and Guo-Qin Ge  
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30. **Fazal Badshah**, Muhammad Irfan, Sajid Qamar and Shahid Qamar *”Effects of mode profile on tunneling and traversal of ultracold atoms through vacuum-induced potentials”* Optics Communication **365**, 157 (2016).
31. **Fazal Badshah**, Shahid Qamar and Mauro Paternostro  
*“Dynamics of interacting Dicke model in a coupled-cavity array”*  
Physical Review A **90**, 033813 (2014).
32. **Fazal Badshah**, Muhammad Irfan, Sajid Qamar and Shahid Qamar *“Effects of detuning on tunneling and traversal of ultracold atoms through vacuum-induced potentials”* Physical Review A **87**, 012132 (2013).
33. **Fazal Badshah**, Muhammad Irfan, Sajid Qamar and Shahid Qamar *“Coherent control of tunneling and traversal of ultracold atoms through vacuum-induced potentials”* Physical Review A **88**, 044101 (2013).
34. **Fazal Badshah**, Muhammad Irfan, Sajid Qamar and Shahid Qamar *“Tunneling and traversal of ultracold three-level atoms through vacuum-induced potentials”* Physical Review A **84**, 032107 (2011).