

Salman Khan

Department of Physics,
COMSATS Institute of
Information Technology (CIIT),
Islamabad, Pakistan.

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Education

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|-----------------------|---|---------------------|
| • Jan 2011— Dec 2011 | Quaid-i-Azam University
Postdoc (Through CERN Project) | Islamabad, Pakistan |
| • Sep 2006 — Aug 2011 | Quaid-i-Azam University
Ph.D (Mathematical/Theoretical Physics)
August 2011 | Islamabad, Pakistan |
| • Session 1995 | University of Peshawar
MSc with distinction (Physics)
April 1996 | Peshawar, Pakistan |
| • Session 1993 | University of Peshawar
BSc (Pure & Applied Mathematics,
Physics)
January 1994 | Peshawar, Pakistan |

Employment

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|--------------------------|--|
| • Dec 2011 — Present | Department of Physics, Comsats Institute of Information
Technology, Islamabad, Pakistan
Assistant Professor |
| • April 2008 — Dec 2011 | Govt: Degree College Ekka Ghund, KP, Pakistan
Assistant Professor |
| • July 1999 — April 2008 | Govt: Degree College Ekka Ghund, KP, Pakistan
Lecturer in Physics |
| • Dec 1998 — July 1999 | Govt: Post Graduate College Khar Bajour, KP, Pakistan
Lecturer in Physics |
| • Jan 1997 — Dec 1998 | Amina Post Graduate College for Women, KP, Pakistan
Lecturer in Physics |

Departmental Committees

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| • Member of DARC (Departmental Advisory Committee) (Nov 2017—Present) | COMSATS University Islambad, Islamabad, Pakistan. |
| • Member of DAC (Departmental Advisory Committee) (Nov 2015—19 Jan 2017) | COMSATS Institute of Information Technology, Islamabad, Pakistan |
| • Member of DARC (Departmental Academic Regulatory Committee) (Aug 2015—19 Jan 2017) | COMSATS Institute of Information Technology, Islamabad, Pakistan |
| • Incharge BS Physics (June 2015—19 Jan 2017) | Govt: Degree College Ekkaghund, KP, Pakistan. |
| • Chief Proctor (Sep 2004—July 2006) | Govt: Degree College Ekkaghund, KP, Pakistan. |
| • Incharge student's affairs (Sep 2001—July 2004) | Govt: Degree College Ekkaghund, KP, Pakistan. |
| • Head of Science Admission committee (July 2002—July 2006) | Govt: Degree College Ekkaghund, KP, Pakistan. |

Research Supervision

- Fall 2018 — Present: Mohammad Bilawal (BS) — **The dynamics of relative entropy and entanglement under Davies Map (CUI)**
- Spring 2018—Fall 2018: Wajiha Zafar (MS) — **The dynamics of swapping of correlations via teleportation in open multipartite system (Comsats)**
- Spring 2018— Fall 2018: Rustum Fayyaz (MS) — **A Mechanism for controlling group velocity in cavity optomechanical system. (Comsats)**
- Fall 2017—Spring 2018: Rabia Siddiqui (MS) — Valid Conditions of reference frame independent quantum key distribution (**Comsats**)
- Fall 2017—Spring 2018: Syeda Sabahat (MS) — **Purification and redistribution of entanglement through local filtering. (Comsats)**
- Fall 2017—Spring 2018: Asma Mariam (MS) — **Revival of quantum correlations without system-environment back-action. (Comsats)**
- Fall 2017—Spring 2018: Farria Ghaffar (BS) — **Mechanism for quantum speedup in open quantum systems. (Comsats)**

- Fall 2014 — Present: Muhamad Musadiq (PhD) — **Quantum Speed limit time of multilevel open quantum systems.** (Comsats)
- Fall 2015—Spring 2017: Safia Ali (MS) — **Information Transmission over an amplitude damping Channel with arbitrary Degree of Memory.** (Comsats)
- Fall 2015—Spring 2017: Farrah Shafiq (MS) — **Coherent control of the Goos-Hanchen shift.** (Comsats)
- Fall 2015—Spring 2017: Muhammad Awais Chatta (MS) — **Optomechanically induced Transparency Associated with steady state entanglement.** (Comsats)
- Jan 2015 — May 2016: Akhter Shah (MS) — **Quantum correlation in hybrid qubit-qutrit quantum systems in the presence of environment.** (AIOU)
- Jan 2014—Feb 2015: Muhammad Awais Chatta and Farrah Shafiq (BS) — **Entanglement and quantum teleportation.** (Comsats)

Co-Supervision

- Fall 2018 — Spring 2019: Asad Quazafi
- Spring 2017 — Spring 2018: Mahboob Alam (MS) — **Distillability sudden death of bipartite qutrit systems.** (Hazara University)
- Fall 2017— Spring 2018: Fateh Gul (MS) — **Entanglement and teleportation through a two-qubit Heisenberg XXZ Model with the Dzyaloshinskii-Moriya interaction** (RIU)
- March 2015– Present: Muhammad Javed (PhD) — **Multi-qubit quantum correlations in different classical noisy environments.** (Malakand University)
- Jan 2014– Present: Wajid Joya (PhD) — **Dynamics of tripartite quantum discord coupled to different spin chain systems.** (Quaid-i-Azam University)

Research Assessment

Following are the research works of the students in the group of my PhD supervisor, which I fully assisted during my PhD, Postdoc and afterward.

- Jan 2014—Feb 2015: Munsif Khan (M.Phil) — **Quantum Entanglement in a Structured Reservoir.** (Quaid-i-Azam University)
- Jan 2014—Feb 2015: Akhter Munir — **Genuine correlations of tripartite system.** (Quaid-i-Azam University)
- Jun 2013—Jun 2014: Ammaria Javed — **Control of entanglement between electronic spins and its spatial states in graphene.** (Quaid-i-Azam University)
- Jan 2013—December 2013: Raheem zada — **Tripartite entanglement of three qubit Werner states.** (Quaid-i-Azam University)
- Jun 2012—Jun 2013: Niaz Ali — **Entanglement of Dirac field in Non-inertial frame.** (Quaid-i-Azam University)

- Jun 2012—Jun 2013: Muhammad Ibrahim — **Effect of Global environment on Dimer system.** (Quaid-i-Azam University)
- Jun 2012—Jun 2013: Quaid Zaman — **Entangled three qubit states with zero concurrence and three tangle.** (Quaid-i-Azam University)
- Jun 2012—Jun 2013: Iskhar Ali — **Three tangle does not properly quantify tripartite entanglement for GHZ type states.** (Quaid-i-Azam University)
- Jun 2011—Jun 2012: Muhammad Junaid — **Study of entanglement and quantum phase transition using renormalization group method.** (Quaid-i-Azam University)
- Jun 2011—Jun 2012: Muhammad Murtaza — **Effects of decoherence on entanglement teleportation.** (Quaid-i-Azam University)
- Jan 2010—Dec 2011: Kalimullah Khan — **Non Markovian Dynamics of a qubit coupled to an Ising Spin Bath.** (Quaid-i-Azam University)
- Jan 2010—Dec 2011: Saima Shaheen — **Entanglement and teleportation through a two qubit Heisenberg XXZ Model.** (Quaid-i-Azam University)

Talks

PIEACE, Islamabad, Pakistan

- **April. 2018** **The characterization of classical noises using qubit as a probe**

Malakand University, Malakand, Pakistan

- **Nov. 2017** **Dynamics of quantum correlations in mixed classical environments**

Comsats, Islamabad, Pakistan

- **Oct. 2017** **Quantum Phase transition via BQD and TQD in XXZ spins chain: Renormalization Techniques**

NILOP, Islamabad, Pakistan

- **Nov. 2015** **Investigating Quantum Discord in open Qubit-Qutrit systems**

International symposium on Light and Life, COMSATS, Pakistan

- **Oct 2015** **Tripartite entanglement in various cavities under dipole-dipole interaction**

Department of Physics, **Hazara University**, Pakistan

- **August 2014** **Dynamics of Quantum Correlations in Qubit—Qutrit Systems**

Department of Physics, **University of Malakand**, Pakistan

- **July 2013** **Environment Assisted Energy Transfer in Dimer System**

Department of Physics, **Lums Lahore**, Pakistan

- **Jun 2013** **Introduction to Modeling of Quantum Games**

Center for Advanced Mathematics and Physics, **NUST Islamabad**, Pakistan

- **Jan 2013** **Quantum Prisoner Dilemma in the presence of Noise**

Department of Physics, **COMSATS Institute of Information technology**, Pakistan

- **Oct 2012** **Quantum Parrando Games as an Open Quantum System**

Department of Physics, **Quaid-i-Azam University**, Islamabad, Pakistan

- **Aug 2011** **Quantum Games in a Noisy Environment**

Seminars and workshops

1. Pak-China Symposium on Quantum Optics 2018 (Invited Speaker).
2. Member of the technical committee for 42nd International Nathiagali summer college on Physics and contemporary Needs 2017, Pakistan. (Activity: Quantum Information and Devices)
3. International Symposium on Light and Life, COMSATS Institute of Information Technology, Islamabad, Pakistan, October 2015. (Invited Speaker).
4. Conference on Quantum Technology, Theory and Applications: University of Hazara, Mansehra, Pakistan, August 2014. (Invited Speaker).
5. 3rd International Workshop on Materials Modeling and Simulations: Malakand University, Malakand, Pakistan, July 2013. (Speaker)
6. National Workshop on Mathematical Aspects of Quantum Information Science: Lums, Lahore, Pakistan, May 2013. (Invited Speaker)
7. Vice Chancellors forum on higher education in the Islamic world: Challenges and opportunities, Islamabad, Pakistan, June 2012. (Member of Technical committee)
8. Nathai Gali Conference on Quantum Information, Islamabad, Pakistan, June 2011. (speaker)
9. Workshop on Dynamics of Strongly Correlated Quantum System, ICTP, Trieste, Italy, June (2010). (Participant)
10. Fourth international Symposium on Quantum Optics, Islamabad, Pakistan, August, (2009). (Participant)
11. Workshop on Improving education and Methods of teaching, Peshawar, Pakistan, March, (2005). (Participant)

Courses taught

@ Comsats Institute of Information Technology

- Spring 12:
 - [PHY609 Advanced Electromagnetic Fields and Waves](#). (Graduate, MS/PhD)
 - [PHY604 Advanced quantum physics](#). (Graduate, MS/PhD)
- Fall 12:

- [PHY223 Electric and Magnetic Fields II](#). (Undergraduate, BS Physics)
- Spring 13:
 - [PHY612 Advanced Statistical Mechanics](#). (Graduate, PhD)
 - [PHY343 Quantum Mechanics II](#). (Undergraduate, BS Physics)
- Fall 13:
 - [PHY232 Vibrations and Waves](#) (Undergraduate, BS Physics)
- Spring 14:
 - [PHY501 Quantum Computation I](#). (Graduate, MS/PhD)
 - [PHY271 Boundary value problems](#). (Undergraduate, BS Physics)
- Fall 14:
 - [PHY101 Mechanics of Particles](#) (Undergraduate, BS Physics)
 - [PHY501 Quantum Computation I](#). (Graduate, MS/PhD)
- Spring 15:
 - [PHY501 Quantum Computation I](#). (Graduate, MS/PhD)
 - [PHY612 Advanced Statistical Mechanics](#). (Graduate, PhD)
- Fall 15:
 - [PHY501 Quantum Computation I](#). (Graduate, MS/PhD)
 - [PHY601 Quantum Computation II](#). (Graduate, MS/PhD)
- Spring 16:
 - [PHY609 Advanced Electromagnetic Fields and Waves](#). (Graduate, MS/PhD)
 - [PHY601 Quantum Computation II](#). (Graduate, MS/PhD)
- Fall 16:
 - [PHY604 Advanced quantum physics](#). (Graduate, MS/PhD)
- Fall 17:
 - [PHY501 Quantum Computation I](#). (Graduate, MS/PhD)
 - [PHY501 Quantum Computing](#). (Undergraduate, BS Physics)
- Spring 18:
 - [PHY601 Quantum Computation II](#). (Graduate, MS/PhD)
- Fall 18:
 - [PHY501 Quantum Computation I](#). (Graduate, MS/PhD)
 - [PHY604 Advanced quantum physics](#). (Graduate, MS/PhD)
- Spring 19:
 - [PHY601 Quantum Computation II](#). (Graduate, MS/PhD)
 - [PHY604 Advanced quantum physics](#). (Graduate, MS/PhD)

Awards

- Honorarium (Remarkable performance)
 - **2015—2016 COMSATS Institute of Information Technology, Islamabad**
- Research Productivity award
 - **2015—2016 COMSATS Institute of Information Technology, Islamabad**
- Honorarium (Remarkable performance)
 - **2014—2015 COMSATS Institute of Information Technology, Islamabad**
- Research Productivity award
 - **2014—2015 COMSATS Institute of Information Technology, Islamabad**
- Research Productivity award
 - **2013—2014 COMSATS Institute of Information Technology, Islamabad**
- Higher Education Commission (HEC), Approved Supervisor 2014.
- Research Productivity award
 - **2012—2013 COMSATS Institute of Information Technology, Islamabad**
- Research Productivity award
 - **2011—2012 COMSATS Institute of Information Technology, Islamabad**
- Research Productivity award
 - **2011—2012 Pakistan Council for Science and Technology**
- Research Productivity award
 - **2012—2013 Pakistan Council for Science and Technology**
- World Federation of Scientists (WFS) (C/O CERN & National Center for Physics, Pakistan) award
 - **Jan 2011 (12 months) for Postdoctoral fellowship taken at Quaid-i-Azam University, Islamabad, Pakistan.**
- World Federation of Scientists (WFS) (C/O CERN & National Center for Physics, Pakistan) award
 - **Jan 2007— Dec 2009 (3 years) for PhD research at Quaid-i-Azam University, Islamabad, Pakistan.**

Peer-Reviewed Journal Papers

Note: The asterisk shows; I am the corresponding author.

34. [Salman Khan*](#), Farrah Shafiq, and Syed Arif ullah, “Giant lateral shift via atom-cavity coupling”, Journal of optical society of America B, 36, 383, (2019).
33. Sana Ullah , M. Maaz, Bakht Amin Bacha, [Salman Khan](#), Arif Ullah, “Rotary photon drag in a Mach-Zehnder-type Sagnac interferometer” Optik - International Journal for Light and Electron Optics 180, 906–912 (2019)
32. Muhammad Umer, Ali Irfan, Mamoona Mahboob, Sobia Ali, Malika Rani, Sikander Azam, [Salman Khan](#), Muhammad Irfan, I.V.Kityk, “Specific thermoelectric features

- of novel $\text{CaPd}_3\text{B}_4\text{O}_{12}$ ($\text{B} = \text{Ti, V}$) perovskites following DFT calculations” *Journal of Physics B, condensed matter* **545**, 330 — 336 (2018).
31. [Salman Khan*](#) and Kalimullah Khan, “Renormalized tripartite entanglement and tripartite quantum discord in the Heisenberg-Ising spin-1/2 chain”, *Journal of Physics B, condensed matter*. **545**, 289 — 296 (2018).
 30. Mahmood Shamirzaie, [Salman Khan*](#) “The Dynamics of Three Different Entropic Measures of Quantum Correlations in Mixed Bipartite State Coupled with Classical Environments” *Fluctuation and Noise Letters* . **17**, 1850023 (2018).
 29. [Salman Khan*](#), Sher Alam, “The dynamics of Nash equilibrium under non-Markovian classical noise in quantum Prisoners' Dilemma” *Reports on Mathematical Physics*, **81**, 397, (2018).
 28. M. Javed, [Salman Khan*](#), Sayed Arif Ullah, “Characterization of classical static noise via qubit as probe, *Quantum Information Processing*, **17**, 53 (2018).
 27. H. Iqbal, M. Idrees, M. Javed, B. A. Bacha, [Salman Khan](#), and S. A. Ullah, Goos–Hanchen shift from cold and hot atomic media using Kerr nonlinearity, *Journal of Russian Laser Research* **38**, 426 (2017).
 26. Wajid Joya, [Salman Khan*](#), M. Khalid Khan, and Sher Alam, “Analytic renormalized bipartite and tripartite quantum discords with quantum phase transition in XXZ spins chain” *The European Physical Journal Plus*, **132**: 215 (2017).
 25. Mohammed Javed, [Salman Khan*](#), Sayed Arif Ullah, “the dynamics of quantum correlations in mixed classical environments”, *Journal of Russian Laser Research*, **37**, 562 (2016)
 24. [Salman Khan*](#), Kalimullah khan, “Renormalized entanglement in Heisenberg-Ising spin-1/2 chain with Dzyaloshinskii-Moriya interaction”, *The European Physical Journal Plus*, **131**, 208 (2016).
 23. M. M. Asif, [Salman Khan*](#), “Zitterbewegung, internal momentum and spin of the circular travelling wave electromagnetic electron”, *The European Physical Journal Plus*, **131**, 37 (2016).
 22. [Salman Khan*](#), Niaz Ali Khan, “Relativistic quantum correlations in bipartite fermionic states” *Pramana Journal of Physics*, **87**, 61 (2016).
 21. [Salman Khan*](#), Munsif Jan, “The Effect of Dipole-Dipole Interaction on Tripartite Entanglement in Different Cavities” *International Journal of theoretical Physics*, **55** 1515–1525 (2016).
 20. [Salman Khan*](#), Ishaq Ahmed, “Environment generated quantum correlations in bipartite qubit-qutrit systems” *Optik - International Journal for Light and Electron Optics*, **127**, 2448-2452 (2016)
 19. [Salman Khan*](#), Niaz Ali Khan, “Relativistic Quantum Speed Limit Time in Dephasing Noise” *The European Physical Journal Plus*, **130**, 216, (2015).
 18. Fazal Ghafoor, Bakht Amin Bacha, and [Salman Khan](#), “Inverse Doppler shift and control field as coherence generators for the stability in superluminal light” *Physical Review A* **91**, 053807 (2015)
 17. [Salman Khan*](#), Tripartite entanglement of fermionic systems in accelerated frames” *Annals of Physics* **348**, 270 – 277 (2014).
 16. [Salman Khan*](#), M. Ibrahim, M. K. Khan “Environment assisted energy transfer in dimer system” *Annals of Physics* **341**, 1–11 (2014).

15. [Salman Khan*](#), Niaz Ali Khan, M. K. Khan “Non-Maximal Tripartite Entanglement Degradation of Dirac and Scalar Fields in Non-Inertial Frames” *Commun. Theor. Phys.* **61**, 281–288 (2014).
14. [Salman Khan*](#) “Generation and sudden death of entanglement in qubit-qutrit systems with depolarizing noise” *Math. Struct. in Comp. Science.* **23**, 1220 –1233 (2013).
13. [Salman Khan*](#), M. K. Khan “Noisy relativistic quantum games in Noninertial frames” *Journal quantum information processing.* **12**, 1351–1363 (2013).
12. [Salman Khan*](#), M. K. Khan, “Entanglement of open quantum system in noninertial frames” *Open Sys. & Info. Dyn.* **19**, 1250013 (2012).
11. [Salman Khan*](#), “Entanglement of Tripartite States with Decoherence in Noninertial frames” *J. Mod. Opt.* **59**, 250 (2012).
10. [Salman Khan*](#), M. K. Khan “Relativistic quantum games in Noninertial frames” *J. Phys. A: Math. Theor.* **44**, 355302 (2011).
9. [Salman Khan*](#), M. K. Khan “Quantum Stackelberg duopoly in Noninertial frames” *Chin. Phys. Lett.* **28**, 070202 (2011).
8. [Salman Khan*](#), M. Ramzan and M. K. Khan “Decoherence effects on multiplayer cooperative quantum games” *Commun. Theor. Phys.* **56**, 228 (2011).
7. [Salman Khan*](#), M. K. Khan “Nondistillability of a distillable qutrit-qutrit state under depolarizing noise” *J. Mod. Opt.* **58**, 918 (2011).
6. [Salman Khan*](#), M. K. Khan “Open quantum system in noninertial frames” *J. Phys. A: Math. Theor.* **44**, 045305 (2011).
5. [Salman Khan*](#), M. Ramzan and M. K. Khan “Quantum Parrondo’s games under decoherence” *Int. J. Theor. Phys.* **49**, 31 (2010).
4. [Salman Khan*](#), M. Ramzan and M. K. Khan “Quantum Monty Hall problem under decoherence” *Commun. Theor. Phys.* **54**, 47 (2010).
3. [Salman Khan*](#), M. Ramzan and M. K. Khan “Quantum Stackelberg duopoly in the presence of correlated noise” *J. Phys. A: Math. Theor.* **43**, 375301 (2010).
2. M. Ramzan, [Salman Khan*](#), M. K. Khan “Noisy Non-Transitive Quantum Games” *J. Phys. A: Math. Theor.* **43**, 265304 (2010).
1. [Salman Khan*](#), M. Ramzan and M. K. Khan “Quantum Model of Bertrand duopoly” *Chin. Phys. Lett.* **27**, 080302 (2010).

Books Published

1. Physics for class 9th and class 10th (Nasir Books, Peshawar, 2005).
2. Classical Mechanics (level BS, BSc), (Nasir Books, Peshawar, 2004).
3. Modern Physics (level BS, BSc) (Nasir Books, Peshawar, 2006).
4. Waves and Oscillations (level BS, BSc) (Nasir Books, Peshawar, 2011).

Refereeing

Have acted as a referee for the following research journals

- *Annals of Physics*
- *Physics letters A*
- *Scientific Report (Nature)*
- *European Physics Journal Plus*
- *Hindawi journal of quantum games*
- *Journal of Physics A: Mathematical and Theoretical*
- *Chinese Physics letter*
- *Quantum Information Processing*
- *Journal of modern physics*
- *International Journal of Theoretical Physics*
- *Optik-International Journal for light and electron optics*

Thesis Evaluation

Have acted as a referee and external examiner for MS thesis

-
- *Single atome Microscopy via surface Plasmon Polariton, Syed Ali Shah* (U. Malakand) Spring 2018
- *Effects of rotary photon dragging on temporal cloaking using Kerr nonlinearity, Aftab Khan* (U. Mlakand). Fall 2017
- *Influence of Chirality on the Electromagnetic wave propagation in an atomic system of Rubidium, Sana Ullah,* (U. Malakand). Spring 2017
- *Engineering Entanglement in Cavity QED for Quantum Networks, Sami ul Haq,* Centre for Advanced Mathematics and Physics (NUST). Spring 2015

Preferred Courses for Teaching

1. Quantum Mechanics (I, II, Adv.)
2. Electrodynamics (I, II, Adv.)
3. Statistical Mechanics (Undergrad, Adv.)
4. Classical Mechanics
5. Mathematical Methods of Physics
6. Quantum Information I, II.
7. Quantum Optics I, II.
8. Thermodynamics

9. Mechanics of Particles
10. Modern Physics
11. Atomic and Molecular Physics
12. Special relativity
13. Waves and Oscillations

