**Curriculum vitae**

Majid KHAN

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**Personal data**

Date of birth: April 10, 1981

Place of birth: Kohat

Nationality: Pakistan

Father’s name: Zakria Khan

Sex: Male

Marital status: Married

**Education / Employment**

January 2016 – date **Assistant Professor (TTS)**

Quaid-i-Azam University, Islamabad, Pakistan

March 2015-Feb 2016 **Postdoc**

Department of Physics, Institute of Fusion Theory and Simulations

Zhejiang University, Hangzhou 310027, China

April 2014- March 2015 Assistant Professor (BPS 19)

Kohat University of Science & Technology, KPK. Pakistan

June 2012- Aug 2014 Assistant Professor (IPFT & Contract)

Quaid-i-Azam University, Islamabad, Pakistan

May 2012 **PhD**

Leopold-Franzens University of Innsbruck, Austria

May 2008–April 2012Employed by the University of Innsbruck, Austria, as scientific collaborator (in the Association EURATOM-OEAW) and as research associate to the Plasma Physics group at the institute for theoretical Physics, Innsbruck Austria.

Nov 2006–Dec 2010 Holder of a Pakistan Overseas PhD Scholarship within the frame of the Austrian/Pakistan Exchange Service (ÖAD)

2004–2006 National Engineering and Scientific Commission (NESCOM) fellowship at QAU Islamabad, Pakistan

Jan –Nov, 2006 Lecturer (Physics) at National University of Computers and Emerging Sciences FAST Islamabad, Pakistan

2007–2012 **PhD thesis,** Plasma and Energy Physics, institute for theoretical Physics, University of Innsbruck, Austria

**Thesis title**: Synergetic and resonant effects on fast ion transport in tokamaks.

June 2006 **M.Phil. in Plasma Physics**

Quaid-i-Azam University, Islamabad, Pakistan

2004–2006 **M.Phil thesis,** Department of Physics

**Thesis title**: Shielding of a test charge in dusty plasma with a dust size distribution.

2002–2004 **M.Sc. in Physics (**4th position**)**

Quaid-i-Azam University, Islamabad, Pakistan

1999– 2001 **B.Sc. in Physics, Mathematics and Computer Science** University of Peshawar, Peshawar, Pakistan

1999 Pre-Engineering, Govt. Post Graduate College Kohat, Pakistan

1997 Completion of High School, Peshawar Board, Pakistan

**Research experience**

July. 2018- **Postdoc Research**

Recently we have started working, along with the nonlinear effects in nonthermal plasma problems, in PIC simulations. For that I visited University of Innsbruck to become familiar with one of the best plasma computational tool namely the Particle in Cell (PIC) that provide an ideal numerical tool for plasma study providing direct simulations of plasma particles. In particular we dealt with the kinetic plasma edge modelling using the electrostatic 1D3V PIC Monte Carlo (MC) code BIT1. This code has been used for studying of general properties of the plasma edge low temperature plasmas, edge plasmas of our day and next generation tokamaks, as well as for teaching of students. Obviously in a short research visit I concentrated on learning the most basic concepts involved in development of BIT1 and get used to it, and to be able to successfully run the code in an MPI environment to reproduce some fundamental plasma physics phenomena, e.g. electrons plasma oscillations in unmagnetized plasmas.The simulation geometry of the code corresponds to a plasma bounded between two conducting walls, diverter plates, and corresponds to the Scrape-off Layer (SOL) of the tokamaks. Different elastic and inelastic processes, such as collisions between charged and neutral particles, different plasma - wall interactions, as well as synthetic diagnostics are implemented into the code. BIT1 uses optimized memory management and allows scaling of massively parallel simulations for at least 8000 cores, allowing simulation of large scale systems with finest resolution.

Dec. 2006-March. 2012 **PhD studies**

Development of an orbit following code based on symplectic integration algorithm (SIA). The developed code is called SIDOC (symplectic integration drift orbit code) and the FORTRAN document is available at Plasma and Energy Physics group, institute for theoretical Physics, Leopold-Franzens University of Innsbruck, Austria

Research topic(s): Development of Monte-Carlo orbit following code to calculate fast ions, in particular fusion born alpha particle, trajectories and radial diffusion coefficient in the presence of different magnetic perturbations in tokamak plasma.

Dec. 2006-March. 2012 **M. Phil. studies**

Analytical and numerical studies of charge particle motion in dusty plasmas with different dust size distributions.

**Trainings/Workshops**

June 27 – July 2, 2004 Attended of 54th Meeting of Nobel Laureates (Physics) in Landau Germany (2004)

March 2006 Pakistan Institute of Physics (PIP) Conference at Department of Physics, University Of Engineering and Technology, Lahore Pakistan (2006)

Mar. 27 – Apr. 1, 200612th Regional Conference on Mathematical Physics, Islamabad

Pakistan (2006)

Aug. 21–Sep. 1, 2006 International Workshop on Frontiers of Plasma Sciences, the Abdus Salam ICTP, Trieste Italy (2006)

Nov. 3 – Nov. 14, 2008 GOTiT course on Gyro-kinetic Theory and Numerics at Max-Planck-Institute for Plasma Physics, Garching Germany 2008

Feb. 22–24, 2011 1st Fast Ions Modelling and Diagnostic (FIMAD1) Workshop, Innsbruck Austria (2011)

Jan. 25–27, 2012 2nd International Workshop on Fast Ions Modelling and Diagnostic (FIMAD2), Innsbruck Austria (2012)

June 24–July 26, 2013 38th International Nathiagali Summer College on Physics and Contemporary needs, Nathiagali Pakistan.

Nov. 2013 First ICTP-NCP International College on Plasma Physics, Islamabad, Pakistan.

Mar. 10–14, 2014 International Scientific Spring, Islamabad, Pakistan.

August 4–9, 2014 39th International Nathiagali Summer College on Physics and Contemporary needs, Nathiagali Pakistan.

May 18-21, 2015 9th International West Lake Symposium,18-21 May, Hangzhou, China

Mar. 12–16, 2018 International Scientific Spring, Islamabad, Pakistan.

**Research Projects**

1. HEC Start-up Research Grant No. PM-IPFP/HRD/HEC/2012/3563: 0.5 Million PKR.
2. HEC Research Grant NO. 20-2/HEC/R&D/PPCR/2017, Pakistan Program for Collaborative Research (PPCR) for stay at IFTS Zhejiang University: PKR 302,000
3. University Research Fund (URF):2017: FNS/17-1790: PKR 130,000/
4. HEC: National Research Program for Universities (NRPU-2016/6183) Co. PI with Dr. Gul Rahman. PKR: 10 Million
5. Ernst Mach-Nachbetreuungsstipendium (EZA) research grant 3300 Euros: for research at University of Innsbruck July-August 2018, GZ: ICM-2017-08065
6. National Research Program for Universities (7632/Federal/NRPU/R&D/HEC/2017) Co. PI with Prof. Dr. Arshad M Mirza. PKR: 4.679 Million
7. HEC Research Grant NO. 10-7(24-3)/HEC/R&D/PPCR/2018, Pakistan Program for Collaborative Research (PPCR) for stay at Innsbruck University: PKR 369,705

**Skills: Teaching and Research**

***Teaching*:** I have three year of teaching experience one year at National University of Computers and Emerging Sciences FAST Islamabad and two years at Quaid-i-Azam University, Islamabad, Pakistan. I will be happy to teach the following courses at the University level

* Basic and advance courses in Plasma Physics
* Electromagnetism
* Classical Mechanics
* Quantum Mechanics
* Statistical Mechanics
* Basic Nuclear Physics
* Mathematical Methods for Physics
* Computational Physics
* Atomic and Molecular Physics

***Research*:** Being part of Plasma Physics community for the last six years, I would like to continue my research work in the same field, in particular Computational Physics, Physics of dusty plasmas and astrophysical plasmas etc.

***PhD Students with title of their thesis:***

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| --- | --- | --- | --- |
| S.No | **Student’s Name** | **Thesis title** | **Enrolled** |
| 1 | Waqar Younas | Physics of space weather effects in ionosphere | 2019 |
| 2 | Tashfeen Rasheed | Nonlinear effects in magnetized plasma | 2020 |
| 3 | Jahanzaib Khan | Quantum relativistic characteristics of fusion-plasma | 2020 |

***M.Phil Students with title of their thesis:***

|  |  |  |  |
| --- | --- | --- | --- |
| **No.** | **Name** | **Title** | **Year** |
| 1 | Abdullah | Fast ions trajectories in tokamaks | 2014 |
| 2 | Arifullah | Numerical simulations of stochastic-differential equations | 2014 |
| 3 | Tashfeen Rashid  (Co-adviser) | Gravitational instabilities in magnetized plasmas | 2014 |
| 4 | Waqar Younas | Study of space weather effects on low, mid and high latitudes ionosphere | 2018 |
| 5 | Zaib-Ali-Qasmi | Fast ions orbits simulations in the presence of MHD perturbation | 2018 |
| 6 | Muddasar Abbasi | Nonlinear ion acoustic waves in non-Maxwellian magnetized plasmas | 2018 |
| 7 | Ghulam Murtaza | Slowing down of fast alpha particles in Maxwellian plasmas | 2018 |
| 8 | Hammad Khalid | Radial diffusion of fast ions in a MHD perturbed tokamak | 2019 |
| 9 | Rubab Mumtaz | Calculations of polytropic coefficient function for non-Maxwellian electron distribution | 2019 |
| 10 | Aqsa Zahid | Symplectic computations of radial diffusion coefficient for a toroidally rippled fusion reactor | 2019 |
| 11 | Fazal Sattar | Dust-ion-acoustic waves in the presence of dust charge fluctuations | 2020 |
| 12 | Muhmmad Arham | Dissipative solitons in non-Maxwellian pair-ion-electron plasmas | 2020 |
| 13 | Sidra Hafeez | Quantization effects on potential distributions around a test charge in electron-positron-ion plasmas | 2020 |
| 14 | Sofia Khalid | A comparative study of PIC simulation methods in tokamak plasmas | 2020 |
| 15 | Muhammad Abrar | Weakly dissipative solitary pulses in a quantum electron-hole plasma | 2020 |
| 16 | Asifullah | Drift modes in non-Maxwellian plasmas | 2020 |
| 17 | Shafiullah | Effects of PPEF on ionospheric currents | 2021 |
| 18 | Sobia Shabbir | Effect of r-q distributed electrons source on polytropic coefficient in TL type bounded plasmas | 2021 |
| 19 | Rahat Abbas | DIA waves in the presence on r-q distributed electrons and dust charge fluctuations | 2021 |

**Languages**

Urdu/Pashto (native), English (good), German (basic)

**Hobbies**

Cricket, swimming, fitness, history, cooking and travelling etc.

**References**

**Prof. Dr. Klaus Schoepf (PhD Supervisor)**

Institute for Theoretical Physics,

Technickerstrasse 25, A-6020 Innsbruck, Austria.

Tel: +43 512 507 6210, E-mail: [Klaus.Schoepf@uibk.ac.at](file:///E:\official\Recent-Doc\Klaus.Schoepf@uibk.ac.at)

**Prof. Dr. Davy Tskhakaya**

Institute for Theoretical Physics,

Technickerstrasse 25, A-6020 Innsbruck, Austria.

Tel: +43 512 507 6225, E-mail: [dtshak@yahoo.com](mailto:dtshak@yahoo.com)

**Prof. Dr. Arshad M. Mirza (M. Phil Supervisor)**

Chairman, Department of Physics,

Quaid-i-Azam University, Islamabad Pakistan.

Tel: +92 9064 2123, E-mail: [amirza@qau.edu.pk](mailto:amirza@qau.edu.pk)**List of publications**

***Book:*** Majid Khan, K. Schoepf and V. Goloborod’ko “Resonance and synergy effects on fast ion transport in tokamak, A symplectic approach”, LAMBERT academic publishing. ISBN: 978-3-659-20603-0

[https://www.amazon.com/Resonance-synergy-effects-transport-tokamaks/dp/36592060***32***](https://www.amazon.com/Resonance-synergy-effects-transport-tokamaks/dp/3659206032)

***Original papers***

1. V. Yavorskij, K. Schoepf, V. Goloborod’ko, M. Cecconello, **M. Khan**, et al., “*Results of Predictive Fokker–Planck Modelling of NBI Deuterons in ITER*”, Journal of Fusion Energy: Volume **30**, Issue 4 (2011), Page 307-322.
2. **M. Khan**, K. Schoepf, V. Goloborod’ko and V. Yavorskij “*Symplectic Simulation of*

*Fast Alpha Particle Radial Transport in Tokamaks in the Presence of TF Ripples and a*

*Neoclassical Tearing Mode*” , Journal of Fusion Energy: Volume **31**, Issue 6 (2012),

Page 547-561.

1. M. Kamran, S. Kuhn, D. Tskhakaya and **M. Khan** “*Extended Tonks-Langmuir type model with non-Boltzmann distributed electrons and cold ion sources*”. Published online in Journal of Plasma Physics, Volume **79**, part 2, pp. 169-187, (2013).
2. **Majid Khan** et al., “*Fast Ion Trajectory Calculations in Tokamak Magnetic Configuration Using Symplectic Integration Algorithm*”, Journal of Fusion Energy: Volume **34**, Issue 2 (2014), Page 298-304.
3. Rashid Khan, Jens Andersen, Lars Kylingstad and **Majid Khan**, “*The chiral phase transition and the role of vacuum fluctuations*”. *Int. J. Mod. Phys. A* **31**, 1650025 (2016)
4. M. Usman, Shahid Khan, **Majid Khan*,*** *et al.* “*Re-crystallization of ITO films after carbon irradiation*”*, Applied Surface Science 392 (2017) 863–866*
5. **Majid Khan** et al., “*Impact of toroidal field ripples and low-frequency modes on the radial diffusion of fast alphas in tokamaks*”. Journal of Fusion Energy (2017) **36**:40–47
6. Arifullah, **Majid Khan, et al.,** “*Monte-Carlo simulation of a stochastic differential equation*” *Plasma Sci. Technol.****19*** *( 2017) 125001.*
7. Javeria Razzaq, Qamar-ul Haq, **Majid Khan**, M Kamran, and Arshad Majid Mirza.  
   „*Nonlinear structure formation in ion-temperature-gradient driven drift waves in pair-ion plasma with nonthermal electron distribution*“, Physics of Plasmas **25**, 022119 (2018)
8. Shahid Khan; Zhizheng Wu; ul haq Mahmood; Guangzhong Yuan; **Majid Kha** “*Study of Annealing Effect upon the Structural and Solar Selective properties of C/Ni/NiO Composite Coatings Prepared by Sol-Gel Method*”, Journal of Sol-Gel Science and Technology, Volume **89**, [Issue 1](https://link.springer.com/journal/10971/89/1/page/1), pp 120–127
9. **Majid Khan, et al.** “*Polytropic Coefficient Function forTonks-Langmuir-Type Bounded Plasmas with Kappa-Distributed Electrons and Cold Ion Source*”, Brazilian Journal of Physics, Volume **49**, [Issue 3](https://link.springer.com/journal/13538/49/3/page/1), pp 372–378 (2019)
10. **Majid Khan, et al.** “Electrostatic shock structures in magnetorotating relativistic plasmas with non-Maxwellian electrons”, AIP Advances **9**, 025034 (2019)
11. Javeria Razzaq, Qamar-ul Haq, .., **Majid Khan.**“*Solitary waves with electron temperature inhomogeniety and shear flow in an electron ion magnetoplasma*”*.* Physics of Plasmas **26 (3)**, 022119 (2019)
12. Imtiaz, N., Younas, W., and **Khan, Majid**. “*Response of low to mid latitude ionosphere to the Geomagnetic storm of September 2017*”, Ann. Geophys. Discuss., **38**, 359 (2020) <https://doi.org/10.5194/angeo-2019-19>.
13. Badri Munir, Aleem, **Majid Khan**, .., “On the *Parallelization and Performance Analysis of Barnes-Hut Algorithm using Java Parallel Platforms*”. SN Applied Sciences **2,** 601 (2020) <https://doi.org/10.1007/s42452-020-2386-z>
14. W. Younas, C. Amory-Mazaudier, **Majid Khan** and R. Fleury, “*Ionospheric and magnetic signatures of a space weather event 25-29 August 2018: CME and HSSWs.* **Accepted** in Journal of Geophysical Research - Space Physics , **2020JA027981** (2020)

<https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1029/2020JA027981>

1. S. Hafeez, S. Ali and **Majid Khan**, “*Effect of quantization and positron concentration on shielding potentials in electron-positron-ion plasma*”, under-review in Contribution to Plasma Physics, **ctpp.202000060** (2020)
2. M. Arham, S. A. Khan and **Majid Khan**, “*Weak dissipation of electrostatic solitary structures in warm collisional pair-ion plasmas with non-Maxwellian electron population*”, under-review in Chinese Journal of Physics, **CJPHY-D-20-00605** (2020)
3. Z. Ehsan, M. M. Abbasi, **Majid Khan...** , “*Shock waves in a rotating non-Maxwellian viscous dusty plasma*”, Contribution to Plasma Physics, published online (2020)

[*https://onlinelibrary.wiley.com/doi/abs/10.1002/ctpp.202000030*](https://onlinelibrary.wiley.com/doi/abs/10.1002/ctpp.202000030)

1. Majid Khan et al., “*Symplectic computations of fast ion trajectory and radial diffusion in MHD perturbed tokamak*”, Journal of Fusion Energy: **39**(3),77-85(2020). <https://link.springer.com/article/10.1007/s10894-020-00236-7>
2. M. M. Abbasi, W. Masood, **Majid Khan** and A. Ahmad, “*Non-linear ion acoustic waves in dissipative and dispersive magneto-rotating relativistic plasmas with two temperature super-thermal electrons*”, Contribution to Plasma Physics, published online (2020).

[*https://onlinelibrary.wiley.com/doi/abs/10.1002/ctpp.202000050*](https://onlinelibrary.wiley.com/doi/abs/10.1002/ctpp.202000050)

1. M. Kamran and **Majid Khan**, “*Calculations of polytropic coefficient for the Tonks-Langmuir Electron-Ion Plasma with non-Maxwellian electron distributions”,* Accepted in Contribution to Plasma Physics. **ctpp.202000043** (2020)
2. M. Kamran, Fazal Sattar and **Majid Khan,** “Dust-ion-acoustic shock waves in the presence of dust charge fluctuation in non-Maxwellian plasmas”. Under-review in Physics Letter A, **PHYLA-D-20-01111**

***Conferences***

1. V. Yavorskij, K. Schoepf, V. Goloborod’ko, M. Cecconello, **M. Khan**, et al., “*Fokker-Planck Modeling of NBI deuterons in ITER*” 22nd IAEA Fusion Energy Conference, Geneva Switzerland Oct. 2008, TH/P3-2 (2008)
2. **M. Khan**, K. Schoepf, V. Goloborod’ko and V. Yavorskij, “*Fractional fast ion transport in magnetically conﬁned plasmas*”, Poster 533 at Combined Ann. Meeting of the Austrian and Swiss Physical Societies, Innsbruck (2009); also in Bulletin SPG/SPS Vol. **26**, 168 (2009) and ÖPG Tagungsband Nr. 59.
3. **M. Khan**, K. Schoepf, V. Goloborod’ko and V. Yavorskij, “*Fractional diffusion model for fast ions in MHD-mode perturbed plasmas*”, Proc. 11th IAEA Technical Meeting on Energetic Particles in Magnetic Confinement Systems, Sep. 2009 Kiev Ukraine, P20 (2009)
4. M. Kamran, S. Kuhn and **M. Khan**“*Correct fluid treatment of the collisionless Tonks-Langmuir model with a cold ion source*”,   37th EPS Conference on Plasma Physics, Dublin Ireland, 21 - 25 June, P5.409 (2010)
5. M. Kamran, S. Kuhn and **M. Khan**“*A new method for calculating the potential distribution in one-dimensional quasi-neutral bounded plasma*”,   37th EPS Conference on Plasma Physics, Dublin Ireland, 21 - 25 June, P5.410 (2010)
6. M. Khan and Z. M. Sheng, “*Impact of TFR and NTM on fast alpha transport in tokamak*” 9th International West Lake Symposium,18-21 May, Hangzhou, China.
7. M. Khan, Zengmao Sheng “Wave particle interaction of energetic charged particles using Hybrid (MHD+kinetic) simulations in a tokamak.” International Scientific School (ISS) in Islamabad, Pakistan from March 12-16, 2018.