FAISAL AKRAM

PROFILE

My area of interest is particle physics, that deals with the study of matter at smallest possible scale. About 50 years ago particle physicists developed a theory of interactions of fundamental particles. This theory, which is called the standard model, is a quantum field theory that describes electroweak and strong interactions so successfully that to date we have no serious evidence against it despite testing it in thousands of different ways. I am specialized in the methods which the physicists use to calculate physical observable using the standard model or its effective field theories.

CONTACT

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HOBBIES

Literature and Painting

QUALIFICATION

PhD in theoretical particle physics
Physics department, Punjab university
Thesis Title: "*Hadronic cross sections of B_c mesons*"

M. Phil in Particle Physics
Centre for high energy physics
Thesis Title: "*B_c absorption cross sections by pions*"

M.Sc. Physics
Govt. College, Lahore
Thesis Title: "*CP Violation in the Standard Model*"

WORK EXPERIENCE

University of the Punjab: Associate Professor
25/08/2020-to date

University of the Punjab: Assistant Professor
06/06/2013–24/08/2020
Research and teaching. I have been teaching physics and particle physics courses at undergraduate and graduate levels.

University of the Punjab: Lecturer
03/06/2000–05/06/2013
Research and teaching.

Punjab Education Department: Lecturer in Physics
22/09/1997–03/06/2000
Teaching physics at higher secondary and undergraduate levels.

REASEARCH PUBLICATIONS

1. Sadia Kanwal, Faisal Akram, Bilal Masud, E.S. Swanson, 'Charmonium spectrum in unquenched quark model', **Euro. Phys. J. A58, 11219 (2022).**

2. Faisal Akram, et. al., 'Effect of the quark-gluon vertex on dynamical chiral symmetry breaking', **Phys. Rev. D 103, 054036 (2021).**

3. Sohail Gilani, Imran Jamil, Bilal Masud, and Faisal Akram '$\rho J/\psi$ scattering in improved many body potential', **Eur. Phys. J. A56, 66 (2020).**

4. Bushra Shafaq and Faisal Akram '*The Effect of the Earth Matter on Three Neutrino Oscillations and Sensitivity to CP Phase Parameter*', **Eur. Phys. J. Plus 135, 94 (2020)**.

5. Shaheen Irfan, Faisal Akram, Bilal Masud, Bushra Shafaq, '*Interactions of B_c meson in relativistic heavy-ion collisions*', **Phys. Rev. C 100, 065906 (2019).**

6. Ishrat Asghar, Faisal Akram, Bilal Masud, and M. Atif Sultan, '*Properties of excited charmed-bottom mesons*', **Phys. Rev. D 100, 096002 (2019).**

7. Nosheen Akbar, Faisal Akram, Bilal Masud, Atif Sultan, '*Conventional and hybrid B_c mesons in an extended potential model*' **Eur. Phys J. A54, 127 (2018).**

8. Faisal Akram, et. el., '*Decays and spectrum of bottom and bottom strange mesons*' **Eur. Phys J. A54, 127 (2018).**

9. Faisal Akram, et. el., '*Higher hybrid bottomonium in extended potential model*', **Phys. Rev. D 95, 074018 (2017).**

10. M. Imran Jamil, Bilal Masud, Faisal Akram and S. M. Sohail Gilani, '*DD* System in QCD-improved many body potential' **Chin. Phys. C 41, 013103 (2017).**

11. Faisal Akram and Bilal Masud, '*Upsilon absorption cross Sections by nucleons*', e-Print arXiv:1309.2923 (2014).

12. Faisal Akram, et. al., '*Higher hybrid charmonia in extended potential model*', **Phys. Rev. D 90, 054001 (2014).**

13. Ghulam Mustafa, Faisal Akram, and Bilal Masud, '*Optimization of neutrino oscillations parameters using differential evolution technique*', **Commun. Theor. Phys. 59, 324-330 (2013).**

14. Faisal Akram, et. al., 'Vacuum polarization and dynamical chiral symmetry breaking', **Phys. Rev. D 87, 013011 (2013).**

15. Faisal Akram and M.A.K Lodhi, '*B_c absorption cross sections by nucleons*', **Nucl. Phys. A 877, 95 (2012).**

16. Faisal Akram and M.A.K Lodhi, '*B_c absorption cross sections by ρ mesons*", **Phys. Rev. C 84, 064912 (2011).**

17. M.A.K Lodhi, Faisal Akram, Shaheen Irfan, '*Hadronic absorption cross sections of B_c*', **Phys. Rev. C 84, 034901 (2011).**

18. Equalization of response functions of SK and SNO, e-Print archive hep-ph/0403006.

19. Faisal Akram, et. al. '*Equalization of response functions of Cl and Ga detectors*', **Journal of Natural Sciences and Mathematics vol. 42, 133 (2002).**

CONFERENCES/SEMINARS/WORKSHOPS

#	Type	Title	Status	Role	Place	Dates
1	School	International school on physics and allied disciplines	International	Invited Speaker	NCP, Islamabad	04/03/2024 to 08/03/2024
2	Meeting	IHEP visit to discuss LHAASO collaboration work	International	Invited	**IHEP, China**	21/01/2024 to 26/01/2024
3	School	12th LHC School on High Energy Physics	International	Invited Speaker	NCP, Islamabad	21/08/2023 to 01/09/2023
4	School	International school on physics and allied disciplines	International	Invited Speaker	NCP, Islamabad	March/2023
5	Symposium	Salam's Day, 7th Feb, 2022	National	Invited Speaker	GCU, Lahore	07/02/2023
6	Symposium	17th Symposium of Frontiers in Physics	National	Invited Speaker	GCU, Lahore	01/12/2022 to 03/12/2022
7	School	CERN's Asia Pacific School of High Energy Physics	International	Invited Speaker	**South Korea**	05/10/2022 to 18/10/2022
8	School	11th LHC School on High Energy Physics	International	Invited Speaker	NCP, Islamabad	22/08/2022 to 02/09/2022
9	Conference	10th International meeting on particles and fields	International	Organized and speaker	NUST, Islamabad	09/05/2022 to 13/05/2022
10	Conference	International conference on innovations in chemistry and physics (ICP-2022)	International	Invited speaker	University of Education, Faisalabad	14/03/2022 to 15/03/2022
11	School	International school on physics and allied disciplines	International (online)	Invited speaker	NCP, Islamabad	14/03/2022 to 18/03/2022
12	Conference	IUPAP regional e-conference on physics	International (online)	Organized and speaker	NCP and GCU, Lahore	18/01/2022 to 21/01/2022
13	Symposium	Salam's Day, 10th Dec, 2021	National	Invited speaker	Abdus Salam school of mathematical sciences, Lahore	10th Dec, 2021
14	Workshop	International workshop on heavy quark physics	International (online)	Invited speaker	NCP, Islamabad	23/11/2021 to 26/11/2021
15	Conference	Memorial meeting in honour of Steven Weinberg	International (online)	Organized	University of Punjab, Lahore	04/10/2021 to 09/10/2021
16	Conference	9th International meeting on particles and fields	International (online)	Organizer and speaker	University of Punjab, Lahore	05/04/2021 to 09/04/2021
17	Workshop	First school on advanced topics on particle physics	National	Invited speaker	NCP, Islamabad	02/09/2019 to 20/09/2019
18	School	8th LHC school on high energy physics	International	Invited speaker	NCP, Islamabad	19/08/2019 to 30/08/2019
19	School	First international school on physics and allied disciplines	International	Invited speaker	NCP, Islamabad	11/03/2019 to 15/03/2019
20	Symposium	16th National symposium on frontiers in physics	National	Invited speaker	GCU, Lahore	29/01/2019 to 31/01/2019
21	School	7th LHC school on high energy physics	International	Invited speaker	NCP, Islamabad	06/08/2018 to 17/08/2018
22	Symposium	15th National symposium on frontiers in physics	National	Invited speaker	GCU, Lahore	29/01/2018 to 30/01/2018
23	Conference	First International meeting to science and society	International	Organizer and speaker	University of Punjab, Lahore	22/11/2017 to 24/11/2017
24	School	6th LHC school on high energy physics	International	Invited speaker	NCP, Islamabad	21/08/2017 to 31/08/2017
25	Conference	International scientific spring	International	Invited speaker	NCP, Islamabad	06/03/2017 to 10/03/2017
26	Symposium	14th National symposium on frontiers in physics	National	Invited speaker	GCU, Lahore	21/11/2016 to 25/11/2016

27	Conference	8th International meeting on particles and field	International	Invited speaker	COMSATS, Lahore	21/04/2016 to 23/04/2016
28	Conference	7th International meeting on particles and fields	International	Organizer and speaker	University of Punjab, Lahore	01/04/2015 to 04/04/2015
29	Symposium	International symposium of physics beyond the standard model	International	Invited speaker	NCP, Islamabad	Aug 2015
30	Conference	6th International meeting on particles and fields	International	Invited speaker	NCP, Islamabad	26/4/2014
31	Conference	5th International meeting on particles and fields	International	Organizer and speaker	University of Punjab, Lahore	26/3/2013

COURSES TAUGHT

I have taught following courses in the institution where I have been serving.

Post Graduate Level:	**Undergraduate level:**
1. Advanced quantum field theory 2. The standard model of particle physics 3. Effective field theories 4. Supersymmetry 5. Electroweak phenomenology 6. Advanced scientific computations 7. Quantum field theory 8. Introduction to high energy physics 9. Relativistic quantum mechanics	1. Classical Mechanics 2. Electromagnetic Theory 3. Statistical Physics 4. Nuclear Physics 5. Quantum Mechanics 6. Mathematical Methods 7. Electronics 8. General Physics 9. Scientific Computation 10. Computational Physics 11. Modern Physics Lab

M.PHIL/PHD PRODUCED

#	Degree	Status	Title of Research
1	PhD	Completed	Chiral symmetry breaking through full quark gluon interaction
2	PhD	Completed	Investigations in Neutrino Oscillations
3	PhD	Completed	Open Charm Mesons in an Extended Quark Potential Model
4	PhD	Under process	Study of properties of light mesons using Schwinger Dyson Equations
5	PhD	Thesis Submitted	QCD phase diagram.
6	PhD	Thesis Submitted	Chiral symmetry breaking at finite temperature
7	PhD	Under process	Production of charm-beauty mesons in pA and AA collisions at LHC
8	MPhil (2013-15)	Completed	Quark-Propagator at finite temperature
9	MPhil (2013-15)	Completed	Study of properties of pion using DSE's and BSE
10	MPhil (2014-16)	Completed	Solutions of QED SDE using CP vertex
11	MPhil (2014-16)	Completed	Solutions of QED SDE using KP vertex
12	MPhil (2014-16)	Completed	Quark condensate in finite temperature QCD
13	MPhil (2015-17)	Completed	Schwinger-Dyson approach in finite temperature QED
14	MPhil (2015-17)	Completed	Light meson spectroscopy using MT model
15	MPhil (2015-17)	Completed	Upsilon absorption cross sections by light hadrons
16	MPhil (2016-18)	Completed	Dynamical breaking chiral symmetry in QED using BB vertex
17	MPhil (2016-18)	Completed	Dynamical breaking chiral symmetry in QED using bare and CP vertices
18	MPhil (2017-19)	Completed	Review on Supersymmetry
19	MPhil (2017-19)	Completed	Quarkonia in non-relativistic potential model
20	MPhil (2017-19)	Completed	QCD propagators in SDEs

21	MPhil (2018-20)	Completed	Status of supersymmetric theories
22	MPhil (2018-20)	Completed	Non-relativistic QCD
23	MPhil (2018-20)	Completed	Soft colinear effective field theory
24	MPhil (2019-21)	Completed	Standard Model Physics in pp collisions
25	MPhil (2019-21)	Completed	Standard Model Physics in e^+e^- collisions
24	M.Sc/BS	Completed	More than 50 students

RESEARCH PROJECTS

#	Title of research project	Investigator as	Starting and ending dates	Funding agency	Funding amount
1	Study of production of charm-beauty mesons in relativistic heavy-ion collisions.	Principal Investigator	01/06/2022 to 31/05/2025	HEC, Pakistan	3,766,642 PKR
2	QCD propagators in Schwinger-Dyson Equations.	Principal Investigator	01/06/2017 to 31/05/2020	HEC, Pakistan	3,716,800 PKR
3	To study characteristics of magnetic fields present in interplanetary space by using galactic cosmic ray sun shadow.	Co-investigator	29/09/2018 to 28/09/2019	HEC, Pakistan	444,500 PKR
4	Study of B_c meson production in Relativistic Heavy-Ion Collision.	Principle investigator	2012-13	University of Punjab, Lahore	125,000 PKR
5	Pion electromagnetic and transition form factors	Principle investigator	2013-14	University of Punjab, Lahore	150,000 PKR
6	Dynamical Chiral Symmetry Breaking in QCD.	Principle investigator	2014-15	University of Punjab, Lahore	150,000 PKR
7	Pion mass and decay constant.	Principle investigator	2015-16	University of Punjab, Lahore	150,000 PKR
8	Study of Υ meson production in Relativistic Heavy-Ion Collision.	Principle investigator	2016-17	University of Punjab, Lahore	150,000 PKR
9	Inclusive B_c production cross section of pp collisions at NLO.	Principle investigator	2021-22	University of Punjab, Lahore	250,000 PKR

RESEARCH GROUPS

I am affiliated/leading the following research groups.

1. Quarkonium Physics Group:
Group heads: Bilal Masud and Faisal Akram
Group full members: Nosheen Akbar, Atif Sultan, Ishrat Asghar

The objective of the group is to provide best possible estimates for the properties charmonia, bottomonia, and B_c mesons.

2. SDE group:
Group heads: Adnan Bashir and Faisal Akram
Group full members: Bilal Masud and Atif Sultan

The objective of the group is to study the properties of hadrons using non-perturbative techniques based on Schwinger Dyson and Bethe Salpeter equations.

CURRICULUM DEVELOPMENT

I have developed the courses of following degree programs for Centre for High Energy Physics, Punjab University.

1. BS computational physics
2. MSc computational physics

3. Member Board of studies and Board of Faculty science.

COMPUTING SKILLS

I am proficient in computer programing languages Python, C/C++, Fortran, Mathematica, and application packages of high energy physics including **SARAH, SPheno, MadGraph, FeynArts, FeynCalc, PYTHIA, HELIC-Onia and ROOT**.

MY WORK ON PUBLIC ENGAGEMENT OF SCIENCE

1. I have delivered numerous public lectures in my institution as well as in other universities and colleges on following topics.

i. Origin of mass in the universe
ii. The Standard Model for Layman
iii. An introduction to Hawking's universe
iv. Bell's inequalities in Quantum Mechanics
v. Feynman's lost lecture on motion of planets.

2. I use to visit local public schools with my PhD/MS students, where we interact with junior students in their classrooms, discussing modern concepts in high energy physics and cosmology in the language which they can understand.

(Updated on 01/04/2024)