Mahmood ul HASSAN

Curriculum Vitae

Education and Training

2007 - 2008 **University of Glasgow**, *UK*, **Post-Doc (Research Fellowship) in Mathematical Physics**.
- Department of Mathematics
- Host Professor: Jonathan Nimmo.
- Research Group: Integrable Systems and Mathematical Physics.

1996 - 2000 **University of Cambridge**, *UK*, **PhD (Doctor of Philosophy) in Physics**.
- St. John's College, Cambridge.
- Department of Applied Mathematics and Theoretical Physics (DAMTP).
- Advisor: Jonathan M. Evans.
- Thesis: Aspects of Integrable Sigma Models.

1995-1996 **University of Cambridge**, *UK*, **Mathematical Tripos Part III (MASt)**.
- St. John's College, Cambridge.
- Department of Applied Mathematics and Theoretical Physics (DAMTP).
- Graduated with **DISTINCTION**.
- Grades: 4 As.
- Courses in Theoretical Physics and Applied Mathematics.

1991-1994 **Government College Lahore**, *Pakistan*, **MSc in Physics**.
- Punjab University.
- Department of Physics.
- Graduated in first class with **FIRST POSITION** in Punjab University and Government College Lahore.
- Aggregate: 84.9
- Thesis: CP violation in the Standard Model.

1989-1991 **Government College Lahore**, *Pakistan*, **BSc in Mathematics and Physics**.
- Punjab University.
- Major in Mathematics and Physics.
- Aggregate: 78.1
- Graduated in first class.

Teaching and Research Experience

December 09, 2019-present **Professor of Physics**, *Punjab University*, Department of Physics.
- MSc, BS courses taught: Classical Mechanics, Relativity and Cosmology.
- MS, PhD courses taught:Quantum Field Theory, Advanced Classical Mechanics
- Research supervision: MS/MPhil and PhD dissertation projects.

July 16, 2018- December 12, 2024	**Chair, Department of Physics**, *Punjab University*. - MSc, BS courses taught: Classical Mechanics, Relativity and Cosmology. - MS, PhD courses taught:Quantum Field Theory, Advanced Classical Mechanics - Research supervision: MS/MPhil and PhD dissertation projects.
May 15, 2008- December 08, 2019	**Associate Professor of Physics**, *Punjab University*, Department of Physics. - MSc, BS courses taught: Classical Mechanics, Relativity and Cosmology. - MS, PhD courses taught: Advanced Mathematical Physics, Quantum Field Theory. - Research supervision: MS/MPhil and PhD dissertation projects. - Coordinator: MS/MPhil and PhD degree program of the department till 2013.
Nov 20, 2007-Nov 18, 2008	**Research Fellow-Post Doc Fellowship**, *University of Glasgow*, Department of Mathematics. - Conducted research in Mathematical Physics and Integrable Systems Group.
June 25, 2004-May 14, 2008	**Assistant Professor**, *Punjab University*, Department of Physics. - MSc, BS courses taught: Classical Mechanics, Quantum Mechanics, Relativity and Cosmology, Analytical Dynamics. - MS, PhD courses taught: Advanced Mathematical Physics, Quantum Field Theory. - Research supervision: MS/MPhil and PhD dissertation projects. - Coordinator: MS/MPhil and PhD degree program of the department.
June 01, 2001-June 24, 2004	**Lecturer**, *Punjab University*, Department of Physics. - MSc, BS courses taught: Classical Mechanics, Quantum Mechanics, Relativity and Cosmology, Theoretical Particle Physics. - MS, PhD courses taught: Advanced Mathematical Physics, Field Theory, Topics in Theoretical Physics. - Research supervision: MS/MPhil and PhD dissertation projects. - Coordinator: MS/MPhil and PhD degree program of the department.
Sep 26, 2000-May 30, 2001	**Assistant Professor**, *University of Lahore*, Department of Mathematics. - MS, PhD courses taught: Real Analysis, Field Theory, Differential Geometry.
Jan, 2000-June 30, 2001	**Visiting Professor**, *Government College Lahore*, Department of Mathematics. - MS course taught: Field Theory.

Awards, Scholarships and Honors

1996-1999	**Horne-Pendlebury Award**, *full scholarship for PhD studies*, St. John's College, Cambridge, UK.
1997-2000	**Overseas Research Student Award**, Higher Education Funding Council, UK.
1999-2000	**Lundgren Research Award**, University of Cambridge, UK.
1999-2000	**Research Award**, Cambridge Commonwealth Trust, UK.
1995-1996	**ODA-Noon Scholarship**, *full scholarship for study leading to Part III Maths Tripos*, Cambridge Commonwealth Trust, UK.
1996	**St. John's College Prize**, *awarded for distinction in Part III Maths Tripos*, St. John's College, Cambridge, UK.
1996	**Fellow**, Cambridge Commonwealth Society, Cambridge, UK.
1994	**Gold Medal**, *awarded for first position in MSc*, Punjab University, Pakistan.
1994	**Academic Certificate of Merit**, Punjab University, Pakistan.
1982	**Recipient of merit scholarship** , Government of Punjab, Pakistan.

2005-2018	**Research Productivity Award**, *Pakistan Council for Science and Technology*, Ministry of Science and Technology, Pakistan.
2005-date	**Incentive Award on Research** , *Punjab University*, Lahore, Pakistan.
2007-2008	**Research Fellowship**, *availed at University of Glasgow*, Higher Education Commission, Pakistan.

Academic and Research Interests

- Theoretical Physics
- Integrable Systems and Soliton Theory
- Supersymmetry
- Classical/Quantum Field Theory

PhD and MS Research Supervision

- **Former PhD students**

2002-2007	Dr. Usman Saleem, PhD Thesis: **Symmetries and Nonlinear Systems**, Project funded by the Higher Education Commission, Pakistan
2002-2007	Dr. Mohsin Siddiq, PhD Thesis: **Aspects of Integrable Systems**, Project funded by the Higher Education Commission, Pakistan
2005-2010	Dr. Bushra Haider, PhD Thesis: **Aspects of Algebraic Methods in Integrable Field Theories**, Project funded by the Higher Education Commission, Pakistan
2011-2016	Dr. Nosheen Mushahid, PhD Thesis: **Symmetries, Solitons and Integrable Models**, Project funded by the Higher Education Commission, Pakistan
2014-2018	Dr. Wajahat Ahmad Riaz, PhD Thesis: **Darboux transformation and discrete integrable systems**
2015-2019	Dr. Arifa Mirza, PhD Thesis: **Various aspects of integrability and supersymmetry**

- **Current PhD students**

2018-date	Ms. Affifa Inam, **Thesis submitted**
2020-date	Ms. Humaira Farooq, **course work completed**
2022-date	Ms. Shaharbano Ahmad, **course work**
2001-date	Supervised and successfully completed more than **30** MS/MPhil research dissertations on various topics of conformal field theory, supersymmetry, integrable systems, Darboux transformation, soliton theory, etc

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Workshops, Conferences and Saminars/Talks

November, 1996	*Geometry and quantum field theory*, Cambridge, UK
Sep, 1997	*Workshop on non-perturbative aspects of quantum field theory*, Cambridge, UK
September, 1998	*UK school in theoretical physics*, Oxford, UK
April, 1998	*Second UK meeting on two dimensional integrable models*, Durham, UK

March, 1998	*Spring school on non-perturbative aspects of string theory*, Treiste, Italy
July, 2001	*Workshop on low dimensional quantum systems*, Treiste, Italy
February, 2008	*Mathematical Physics Seminar*, Glasgow, UK
April, 2008	*Noncommutative integrable systems*, Glasgow, UK
October, 2008	*London Mathematical Society workshop on integrable systems*, Glasgow, UK
June, 2009	*School and Workshop on integrable systems and scientific computing*, Treiste, Italy
February, 2023	*Organised as Chair, First International Conference on Advanced Functional Materials*, Punjab University, Lahore
November, 2019	*Organised as Chair, Frst International Symposium on Advanced Energy Storage Materials*, Punjab University, Lahore
November, 2019	*Organised Lecture series on Integrable Systems and Nonlinear Physics*, Punjab University, Lahore
2021	*Organised virtual meetings with the team of ALICE at CERN, Geneva, Switzerland*, Punjab University, Lahore
March, 2022	*Organised virtual meeting with the CERN task force to review five year associate membership of CERN*, Punjab University, Lahore
February, 2024	*Organised as Chair, International Conference on 3D printed and energy conversion materials*, Punjab University, Lahore
February, 2024	*Invited speaker, Centennial Celebration of Bose-Einstein Statistics-A legacy of Dhaka*, Dhaka University, Bangladesh
1993 to date	*Participated and delivered talks in numerous conferences at national level*, Pakistan
1993 to date	*Convener and advisory board member of various International Conferences*, Pakistan

Physics and University Committees

2001-date	*Member Board of Studies*, Department of Physics, Punjab University, Lahore
2018-2024	*Convener, Board of Studies*, Department of Physics, Punjab University, Lahore
2001-date	*Member Board of Faculty*, Faculty of Science,Punjab University, Lahore
2002-2013	*Coordinator of MS/PhD degree Program*, Department of Physics, Punjab University, Lahore
2002-date	*Member Departmental Doctoral Program Committee*, Department of Physics ,Punjab University, Lahore
2002	*Member BS Curriculum Committee*, Department of Physics, Punjab University.
2002	*Member MS/PhD Curriculum Committee*, Department of Physics, Punjab University.
2010	*Member Selection Board for faculty appointments*, various universities and service commissions of Pakistan
2011-2013	*Member Board of Studies*, Department of Basic Sciences, National Textile University, Faisalabad
2014-date	*Member Departmental Tenure Review Committee (DTRC)*, Department of Physics, University of the Punjab, Lahore
2008-date	*Member PhD Thesis Exam Committee*, COMSATS Institute of Information Technology, University of Sargodha

2018-date	*Member Academic Council*, Punjab University, Lahore
2018-date	*Member Senate*, Punjab University, Lahore
2018-date	*Member Equivalence Committee*, Punjab University, Lahore
2018-2022	*Member Ranking Committee*, Punjab University, Lahore
2018-date	*Member Departmental Tenure Review Committee*, University of Education, Lahore
2019-date	*Member Board of Governors*, Centre of Excellence in Solid State Physics, Punjab University, Lahore
2021-date	*Member Board of Studies*, Center for High Energy Physics, Punjab University, Lahore
2021-date	*Member Incentive Award Committee*, Punjab University, Lahore
2024-date	*Member Board of Studies*, University of Education, Lahore
2024	*Convener and Member National Curriculum Review Committee,(NCRC) Physics* , Higher Education Commission HEC, Islamabad

Computer and Software Skills

Math Packages	Mathematica, Matlab
OS	Windows, Mac OS X, DOS
Typography	Scientific Workplace, Scientific Word, Latex

Teaching and Curriculum Development

2002	*Best Teacher Award*, Punjab University, Lahore
2000-	*Designed and taught courses on Quantum Mechanics, Classical Mechanics, Mathematical Physics, Quantum Field Theory, Classical Field Theory, Relativity and Cosmology, Particle Physics, Real Analysis, Differential Geometry, Group Theory, Lie Algebras etc.*, Department of Physics, Punjab University, Lahore
2002	*Developed curriculum and course outlines of MS and regular PhD degree programs since their inception in 2002.*, Department of Physics, Punjab University, Lahore
2002	*Developed curriculum and course outlines of BS (4 years) degree program for the first time in Pakistan in 2002.*, Department of Physics, Punjab University, Lahore

List of Journal Publications (indexed by JCR-ISI Web of Science)

1999	J. M. Evans, M. Hassan, N. J. MacKay and A. J. Mountain: *Local conserved charges in principal chiral models*, Nuclear Physics B561 (1999), 385-412.
2000	J. M. Evans, M. Hassan, N. J. MacKay and A. J. Mountain: *Conserved charges and supersymmetry in principal chiral and WZW models*, Nuclear Physics B580 (2000), 605-646
2005	U. Saleem and M. Hassan, *Zero-curvature formalism of supersymmetric principal chiral model*, European Physical Journal C38 (2005), 521.
2005	M. Siddiq and M. Hassan, *On the linearization of the super sine-Gordon equation*, Europhysics Letters 70 (2005), 149.
2005	U. Saleem, M. Hassan and M. Siddiq, *Conserved quantities in noncommutative principal chiral model with Wess-Zumino term*, Journal of Physics A: Mathematical and General: 38 (2005), 9241.

2005   U. Saleem, M. Siddiq and M. Hassan, *On noncommutative sinh-Gordon equation*, Chinese Physics Letters 22 (2005), 1076.

2005   M. Siddiq and M. Hassan, *From Backlund transformation to linear system of sine-Gordon theory in superspace*, Chinese Physics Letters 22 (2005), 1567.

2006   U. Saleem and M. Hassan, *Superfield Lax formalism of supersymmetric sigma model on symmetric spaces*, European Physical Journal C46 (2006) 797-805.

2006   M. Siddiq, M. Hassan, U. Saleem, *On Darboux transformation of the supersymmetric sine-Gordon equation*, Journal of Physics A: Mathematical and General: 39 (2006) 7313-7318.

2006   U. Saleem, M. Hassan, *Lax pair and Darboux transformation of noncommutative U(N) principal chiral model*, Journal of Physics A: Mathematical and General: 39 (2006) 11683.

2007   U. Saleem, M. Hassan and M. Siddiq, *Non-local continuity equations and binary Darboux transformation of non-commutative (anti) self-dual Yang-Mills equations*, Journal of Physics A: Mathematical and Theoretical: 40 No 19 (2007) 5205-5217.

2008   M. Siddiq, U. Saleem, M. Hassan, *Darboux transformation and multisoliton solutions of a noncommutative sine-Gordon system*, Modern Physics Letters A 23 115-127 (2008).

2008   Bushra Haider and M. Hassan, *On algebraic structures of the supersymmetric principal chiral model*, European Physical Journal C 53, 627-633 (2008).

2008   Bushra Haider and M. Hassan, *The U(N) chiral model and exact multisolitons*, Journal of Physics A: Mathematical and Theoretical 41, 255202 (2008).

2009   M. Hassan, *Darboux transformation of the generalized coupled dispersionless integrable system*, Journal of Physics A: Mathematical and Theoretical 42, 065203 (2009).

2009   Bushra Haider and M. Hassan, *Quasideterminant solutions of an integrable chiral model*, Journal of Physics A: Mathematical and Theoretical 42, 355211 (2009).

2010   U. Saleem and M. Hassan, *Quasideterminant solutions of the generalized Heisenberg magnet model*, Journal of Physics A: Mathematical and Theoretical 43 045204 (12pp) (2010).

2010   Bushra Haider and M Hassan, *Quasideterminant multisoliton solutions of a supersymmetric chiral field model in two dimensions*, Journal of Physics A: Mathematical and Theoretical 43 035204 (19pp) (2010).

2011   U. Saleem and M. Hassan, *Darboux transformation and multi-soliton solutions of principal chiral and WZW models*, Modern Physics Letters A 26 73-85 (2011).

2011   Bushra Haider, M. Hassan, U. Saleem *Binary Darboux transformation and quasideterminant solutions of the chiral field*, Journal of Nonlinear Mathematical Physics, 18, 2, 299 (2011)

2011   Bushra Haider, M. Hassan, *Binary Darboux transformation of supersymmetric chiral field model*, Journal of Nonlinear Mathematical Physics, 18, 4, 557-581 (2011)

2012   Bushra Haider, M. Hassan, *Quasigrammian solutions of the coupled dispersionless integrable system*, Symmetry, Integrability, Geometry: Methods and Applications (SIGMA) 8, 084, 2012

2012   U. Saleem, M. Hassan, *Darboux transformation and multisoliton solutions of the short pulse equation*, Journal of Physical Society of Japan, 81, 094008, 2012

2013   N. Mushahid, M. Hassan, U. Saleem, *Conserved quantities in the generalized Heisenberg magnet (GHM) model*, Modern Physics Letters A Vol. 28, No. 7 (2013) 1350020

2013   N. Mushahid, M. Hassan, *On the Zakharov-Shabat dressing method for the generalized coupled dispersionless integrable system*, Modern Physics Letters A Vol. 28, No. 20 (2013) 1350088 (20 pages)

2014   N. Mushahid, M. Hassan, *A noncommutative coupled dispersionless system, Darboux transformation and explicit solutions*, Modern Physics Letters A Vol. 29, No. 39 (2014) 1450206 (20 pages)

2015   U. Saleem, M. Hassan, *Quasideterminant solutions of nonlinear Schrodinger equations based on Hermitian symmetric spaces*, Communications in Nonlinear Science and Numerical Simulation Vol. 23, No. 1-3 (2015) 343-365

2017   U. Saleem, M. Hassan, *Darboux transformation and exact multisolitons of CP^N nonlinear sigma model*, Journal of Mathematical Analysis and Applications Vol. 447, No. 2 (2017) 1080-1101

2017   Arifa Mirza, M. Hassan, *Bilinearization and soliton solutions of $N=1$ supersymmetric coupled dispersionless integrable system*, Journal of Nonlinear Mathematical Physics Vol.24, No. 1 (2017) 107-115.

2017   H. W. A. Riaz and M. Hassan, *Darboux transformation of a semi-discrete coupled dispersionless integrable system*, Communications in Nonlinear Science and Numerical Simulation, Vol.48, (2017) 387-397

2017   U. Saleem, M. Hassan, *Exact solutions of Hermitian symmetric space derivative nonlinear Schrodinger equations*, Journal of Physical Society of Japan, 86,(2017), 064002

2018   H. W. A. Riaz and M. Hassan, *Multisoliton solutions of integrable discrete and semi-discrete principal chiral equations*, Communications in Nonlinear Science and Numerical Simulation, Vol.54, (2018) 416-427

2018   H. W. A. Riaz and M. Hassan, *Darboux transformation for a semidiscrete short-pulse equation*, Theoretical and Mathematical Physics 194 (3), (2017) 418-435

2018   H. W. A. Riaz and M. Hassan, *Multi-component semi-discrete coupled dispersionless integrable system, its lax pair and Darboux transformation*, Communications in Nonlinear Science and Numerical Simulation 61, (2018) 71-83

2018   H. W. A. Riaz and M. Hassan, *A discrete generalized coupled dispersionless integrable system and its multisoliton solutions*, Journal of Mathematical Analysis and Applications 458 (2), (2018) 1639-1652

2018   H. W. A. Riaz and M. Hassan, *On soliton solutions of multi-component semi-discrete short pulse equation*, Journal of Physics Communications, 2 (2018) 025005

2018   H. W. A. Riaz and M. Hassan, *Generalized lattice Heisenberg magnet model and its quasideterminant soliton solutions*, Theoretical and Mathematical Physics 195 (2), (2018) 197-208

2018   H. W. A. Riaz and M. Hassan, *Noncommutative negative order AKNS equation and its soliton solutions.* Modern Physics Letters A 33.35 (2018) 1850209.

2018   H. W. A. Riaz and M. Hassan, *A discrete generalized coupled dispersionless integrable system and its multisoliton solutions.* Journal of Mathematical Analysis and Applications 458.2 (2018) 1639-1652.

2018   H. W. A. Riaz and M. Hassan, *Multi-component noncommutative coupled dispersionless system and its quasideterminant solutions.* Modern Physics Letters A 33.15 (2018) 1850086.

2019 A. Mirza and M. Hassan, *Bilinearization and soliton solutions of a supersymmetric multicomponent coupled dispersionless integrable system.* Theoretical and Mathematical Physics, 201, (2019) 1723–1731

2019 H. W. A. Riaz and M. Hassan, *An integrable noncommutative generalization of the AB system and its multisoliton solutions.* Communications in Nonlinear Science and Numerical Simulation 79, (2019) 104936

2020 H. W. A. Riaz and M. Hassan, *Quasi-Grammian solutions of a multi-component short pulse equation.* Journal of Geometry and Physics, 155 (2020) 103766.

2020 A. Mirza and M. Hassan, *Bilinearization and soliton solutions of the supersymmetric coupled KdV equation.* Theoretical and Mathematical Physics, 202, (2020) 11-16

2023 A. Inam and Mahmood ul Hassan, *Exact solutions of an N-component discrete coupled integrable system.* Theoretical and Mathematical Physics, 214, (2023) 36-71

2023 A. Mirza and M. ul Hassan, *A supersymmetric second Painleve hierarchy and bilinearization* Theoretical and Mathematical Physics, 216, (2023) 36-42

2024 A. Mirza and M. ul Hassan, *Superfield Backlund and Darboux transformations for an N=1 supersymmetric coupled dispersionless integrable system.* Theoretical and Mathematical Physics, 219, (2024) 114-123

2024 A. Inam and M. ul Hassan, *Quasi-Grammian loop dynamics of a multi-component semidiscrete short pulse equation.* to appear in Theoretical and Mathematical Physics, (2023)

2024 A. Inam and M. ul Hassan, *Quasi-Grammian soliton and kink dynamics of an M-component coupled integrable system.* to appear in Theoretical and Mathematical Physics, (2024)

2024 A. Inam and M. ul Hassan, *On loop, cuspon and soliton solutions of a multi-component discrete complex short pulse eqation.* to appear in Theoretical and Mathematical Physics, (2024)

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