Rashad Hamidi PhD in Theoretical Physics

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رشاد حميدي

Research Interests: Integrable Models, String Theory, Supersymmetry.

Current State: PhD student in Mathematical and Theoretical Physics group at Durham University, UK.
Supervisor: Prof. Ben Hoare.
Completion expected: August 2026.

Research Interests

My primary research interests lie in the areas of integrable systems, supersymmetry, and string theory. I am particularly focused on exploring integrable sigma models, their deformations, and their connections to higher-dimensional gauge theories, such as 4d Chern-Simons theory. My work involves studying the mathematical structures underlying these models, including quantum groups and Yang-Baxter equations, as well as investigating their physical implications.

Research Papers

- Hamidi, R., Hoare, B. Twists of trigonometric sigma models. *High Energ. Phys.* **2025**, 90 (2025). https://doi.org/10.1007/JHEP08(2025)090

Others

- Hamidi, R. *BTZ Black Hole: Holographic Duality, Entropy, and AdS_3/CFT_2.* MSc Thesis supervised by Iqbal, N. 2022.
- Hamidi, R. *Fractional Quantum Mechanics.* BSc Thesis supervised by Sayyed-Ahmad, A. 2022.

Talks and Posters

- **IDD25**: Poster presentation at *Integrability, Dualities and Deformation (2025 Edition) conference*, Nordita, Stockholm, 2025: "Integrable 2d trigonometric Z_n-twisted σ-models." [PDF]
- **NBMPS74**: Talk at *North British Mathematical Physics Seminars (74th Edition)*, York University, 2025: "Twists of trigonometric sigma models." [PDF]
- **HEP4P**: Online talk at *High-Energy Physics for Palestine Seminars*, 2024: "Integrable models form 4d Chern-Simons action."
- **BZU PHYS Seminars**: Talk at *Department of Physics Seminars*, Birzeit University, 2021: "Fractional Quantum Mechanics."

Study Experience

- [2022-Exp.2026] PhD in *Mathematical and Theoretical Physics*, Department of Mathematical Sciences, Durham University, UK.
- [2021-2022] MSc in *Particles, Strings and Cosmology*, Department of Mathematical Sciences, Durham University, UK.
- [2017-2021] BSc in *Physics*, Department of Physics, Birzeit University, Palestine.

Honors

- [2022] Distinction certificate for *MSc in Particles, Strings and Cosmology*, Department of Mathematical Sciences, Durham University, UK. [PDF]
- [2021] Distinction certificate for *BSc in Physics*, Department of Physics, Birzeit University, Palestine. [PDF]
- [2021] Honor list for spring 2021 term at Birzeit University.
- [2020] Honor list for fall 2020 term at Birzeit University.
- [2020] Honor list for spring 2020 term at Birzeit University.
- [2019] Honor list for fall 2019 term at Birzeit University.
- [2019] Honor list for spring 2019 term at Birzeit University.
- [2018] Honor list for fall 2018 term at Birzeit University.
- [2018] Honor list for spring 2018 term at Birzeit University.
- [2017] Honor list for fall 2017 term at Birzeit University.

Awards and Scholarships

- [2022] STFC Scholarship for PhD research at Department of Mathematical Sciences at Durham University.
- [2021] Global Masters Scholarship for 1-year postgraduate studies at Department of Mathematical Sciences at Durham University.
- [2021] Honor Scholarship for spring 2021 term at Birzeit University.
- [2020] Honor Scholarship for fall 2020 term at Birzeit University.
- [2020] Mosa Naser Scholarship for Physics for 2020/2021 academic year at Birzeit University.
- [2020] Honor Scholarship for spring 2020 term at Birzeit University.
- [2019] Honor Scholarship for fall 2019 term at Birzeit University.
- [2019] Mosa Naser Scholarship for Physics for 2019/2020 academic year at Birzeit University.
- [2019] Honor Scholarship for spring 2019 term at Birzeit University.
- [2018] Honor Scholarship for fall 2018 term at Birzeit University.
- [2018] Mosa Naser Scholarship for Physics for 2018/2019 academic year at Birzeit University.
- [2018] Honor Scholarship for spring 2018 term at Birzeit University.
- [2017] Paltel Scholarship for undergraduate studies at Birzeit University.
- [2017] Science Faculty Scholarship for 2017/2018 academic year at Birzeit University.

Work Experience

- [2023 - present] Teaching Assistance
  Department of Mathematical Sciences at *Durham University*
  - [Michaelmas Term 2025] Discrete Mathematics.
  - [Epiphany Terms 2024] Single Math A, Single Math B.
  - [Michaelmas Terms 2024] Single Math A, Single Math B.
  - [Epiphany Term 2024] Special Relativity & Electromagnetism II, Mathematical Physics II.
  - [Michaelmas Term 2023] Mathematical Physics II.
  - [Epiphany Term 2023] Special Relativity & Electromagnetism II.
- [2017 - 2021] Astronomical Observatory Tour Guide
  Michel and Sanieh Hakim Observatory at *Birzeit University*
  - Led engaging and educational guided tours of the observatory facilities for diverse audiences, including university students, faculty, school groups, and the public.

- Developed and delivered accessible presentations on astronomical concepts, celestial objects, and current space science news to supplement viewing sessions.
- Operated the observatory's main telescope and associated equipment to locate and showcase celestial objects like planets, stars, nebulae, and galaxies during public viewing nights.
- Assisted in the planning, promotion, and execution of special public outreach events, such as eclipse viewings, meteor shower nights, and guest lectures.

Groups and Memberships

- [2022 - present] Ben Hoare Integrability Group at Durham University.
- [2022 - present] Mathematical and Theoretical Physics Group at Durham University.
- [2022 - present] High Energy Physics for Palestine Group.
- [2021 - present] Center of Particle Theory (CPT) at Durham University.
- [2019 - 2020] Physics Club at Birzeit University.
- [2017 - 2018] Astronomy Club at Birzeit University.

Conferences, Workshops and Schools

- Integrability, Dualities and Deformation 2025 Conference, Nordita, Stockholm University, 2025.
- Integrability in Gauge and String Theory 2025 Conference, King's College London, 2025.
- North British Mathematical Physics Seminars 74, York University, 2025.
- North British Mathematical Physics Seminars 72, Durham University, 2024.
- DurHack 2024, Durham University, 2024.
- Integrability, Dualities and Deformation 2024 Conference, Swansea University, 2024.
- North British Mathematical Physics Seminars 71, York University, 2024.
- North British Mathematical Physics Seminars 69, Durham University, 2023.
- Paths to Quantum Field Theory 2023 Workshop, Durham University, 2023.
- Integrability, Dualities and Deformation 2023 Conference, Durham University, 2023.
- Young Researchers Integrability School and Workshop 2023, Durham University, 2023.
- Integrability in Gauge and String Theory 2023 Conference, ETH Zurich, 2023.
- North British Mathematical Physics Seminars 66, Durham University, 2022.
- Paths to Quantum Field Theory 2022 Workshop, Durham University, 2022.
- Meteorology Conference, Birzeit University, 2020.
- Palestinian Advanced Physics School by Scientists for Palestine, Birzeit University, 2019.
- Condensed Matter Conference, Birzeit University, 2019.

- Hands-on Molecular Dynamics Workshop by Palestinian-German Science Bridge, Birzeit University, 2019.
- Computational Multiphysics Conference, Birzeit University, 2019.
- Physics Without Frontiers Workshop by Abdus Salam International Centre for Theoretical Physics (ICTP), Birzeit University, 2017.
- Black Holes Conference by Harvard-Smithsonian Center for Astrophysics, Birzeit University, 2017.

Pre-University Participation:

- Access Programme by AMIDEAST, 2014-2016.
- Physics Olympiad, Ramallah, 2015.
- Science Exhibition, Tulkarm, 2015.
- First Lego League (FLL) Robotics Competition, Birzeit University, 2014.
- Science and Technology Entrepreneurship Program (STEP) by Al-Nayzak Organization, Ramallah, 2014.
- First Lego League (FLL) Robotics Competition, Birzeit University, 2013.
- Intel ISEF (International Science and Engineering Fair), Ramallah, 2012.
- SyscoLab Competition, Ramallah, 2012.
- SEEK Electronic Bag Training, Ramallah, 2012.

Skills

- **Languages**: My first language is Arabic and I'm fluent in English.
- **Programming**: I mainly use Python and Mathematica, took a course in C, dealt previously with MATLAB, Octave, and R, do HTML, PHP, JavaScript, and CSS for fun, and use LaTeX for scientific writing.
- **Application development**: I programmed multiple applications in physics and other fields, e.g. particle physis visualizer, interactive periodic table, fractal explorer, Feynman diagram generator, AI chatbot, Unicode explorer, and some games. Some of them are presented on my website. [View]
- **Dataset organization**: I'm developing datasets related to science fields for app developments and AI training, e.g. fundamental particles and supersymmetry dataset, chemical elements dataset, and the first 1 million prime number dataset. [View]
- **AI integration**: I train free and open-source AI models to programme AI chatbots for personal usage.
- **Web design**: I used to design websites by coding, mainly HTML, PHP, JavaScript, and CSS. I also use site-builder platforms like Google Sites. [View]

- **Electronic Circuits**: I worked previously on Arduino circuits with its programming language, LabVIEW and virtual circuits, and other electronic bags like SEEK and SyscoLab.
- **Astrophotography and spectroscopy**: I worked on different astrophysics and astronomical applications, e.g. RSpec for spectroscopy, where I analysed the spectrum of different stars, including Rigel and Sirius. I used other apps such as Stellarium for astronomical observations and Celestia Portable for astronomy visualisations.
- **Fractals visualisations**: I used multiple applications for drawing fractals such as Apophysis and Chaotica, and I also developed an application to draw fractals such as Mandelbrot set and Julia set. [View]
- **3d design and mathematical graphing**: I'm familiar with multiple 3d engines such as Unity, Blender and Unreal Engine for 3d design and animation. I worked also on AutoCAD for 2d and 3d design planning. Moreover, I'm familiar with multiple graphing calculators such are Desmos and GeoGebra. I also programmed my own graphing calculator. [View]

Courses

- **MSc in Particles, Strings and Cosmology:**
  Department of Mathematical Science and *Department of Physics* at *Durham University*
  - [QFT] Quantum Field Theory
    - [IFT] Introductory Field Theory
    - [QFTI & QFTII] Quantum Field Theory I & II
    - [QED] Quantum Electrodynamics
    - [SUSY] Supersymmetry
  - [GR/COS] General Relativity and Cosmology
    - [GR] General Relativity
    - [COSI & COSII] Cosmology I & II
    - [NU] Neutrino Physics
    - [ASTRO] Astroparticle Physics
  - [GAUGE] Gauge Field Theory
    - [GRP] Group Theory
    - [SM] Standard Model
    - [RG] Renormalisation Group
    - [AMPL] Scuttering Amplitudes
    - [NPP] Non-Perturbative Physics
  - [STRINGS] Superstring Theory
    - [CFT] Conformal Field Theory

    - [STRINGS] String Theory
  - [PHENO] Phenomenology
    - [QCD] Quantum Chromodynamics
    - [FLAV] Flavour Physics and Effective Field Theories
    - [HIGGS] Higgs Physics
  - Extra Courses
    - [AdS/CFT] Introduction to AdS/CFT
    - [ALI] Practical guide to analytic loop integration
- **BSc in Major Physics Minor Mathematics:**
  Department of Physics and *Department of Mathematics* at *Birzeit University*
  - [PHYS] Physics
    - General Physics I, II & III
    - Modern Physics
    - Medical Physics
    - Astronomy
    - Vibrations and Waves
    - Optics
    - Analog Electronics
    - Mathematical Physics
    - Classical Mechanics I, II & MSc
    - Electromagnetic Theory I & II
    - Quantum Mechanics I & II
    - Thermal Physics and Statistical Mechanics
    - Computational Physics
  - [PHYS/LAB] Physics Labs
    - General Physics Lab I, II & III
    - Modern Physics Lab
    - Analog Electronics Lab
    - Advanced Physics Lab
  - [MATH] Mathematics
    - Calculus I, II & III
    - Foundations of Mathematics (Logic)
    - Linear Algebra I & II (& attended MSc)
    - Ordinary Differential Equations
    - Partial Differential Equations
    - Numerical Methods
    - Abstract Algebra I
    - Mathematical Analysis I

    - (attended Matrix Theory MSc)
- [STAT] Statistics
    - Statistics I
    - Statistics III (Probability Theory)
- [COMP] Computer Science
    - Programming C
- Extra Courses:
    - General Chemistry I
    - General Chemistry Lab I
    - General Biology I
    - General Biology Lab I
    - Modern and Contemporary European Civilization
    - Modern and Contemporary Arab Thought

Course-Based Projects

- BTZ Black Hole: Holographic Duality, Entropy, and AdS_3/CFT_2, *Particles, Strings and Cosmology*, summer 2022.
- Fractional Quantum Mechanics, *Quantum Mechanics*, spring 2021.
- Computational Planetary Motion, *Computational Physics*, fall 2020.
- Many Body Problem, *Computational Physics*, fall 2020.
- Cellular Automata, *Computational Physics*, fall 2020.
- Interactive Visualization of the Logistic Map, *Computational Physics*, fall 2020.
- Stellar Spectroscopy – Rigil, Betelgeuse and Sirius, *Astronomy*, spring 2020.
- Magnetic Fluids, *Nanophysics*, fall 2019.
- Vantablack - Optical Coating and 3D Light Microscopy, *Medical Physics*, spring 2019.

Referees

Name	Email	Webpage
Prof. Ben Hoare	ben.hoare@durham.ac.uk	https://www.benhoare.info/
Dr. Ana Retore	ana.retore@desy.de	
Prof. Nabil Iqbal	nabil.iqbal@durham.ac.uk	https://www.nabiliqbal.com/