Roshan Raj

Curriculum Vitae

Upto Dec., 2023

Personal Details

Name:	Roshan Raj
Nationality:	Indian
Present address:	Surat, Gujarat, India-395007
Webpage:	kaalkrit.github.io
Email:	roshankaalkrit36@gmail.com

Research Interests

I'm interested in the theoretical realms of Quantum Field Theories and Quantum Foundations. Fundamentally passionate about getting the essence of Mass, Time, Charge, and Symmetries in the Universe and aspiring to engage in Unification Theories and interpretative endeavours over time.

Educational Details

2019-24	Five Years Integrated M.Sc. (Physics), *Sardar Vallabhbhai* National Institute of Technology (SV-NIT), Surat, India. CGPA: 9.35/10 (current) Title of Dissertation: *Quantum and Classical Applications of Relativistic Relationship of Kinetic Energy and Momentum*.* Supervisor: Dr. Vikash K. Ojha. - A relationship between kinetic energy and momentum of a relativistic system is derived and used in quantum and classical mechanical problems and also to demonstrate that its quantized operator can formulate a *consistent* relativistic quantum mechanical Hamiltonian, find eigenvalues of relativistic anharmonic oscillators and additionally, the relation and alternate relativistic kinetic energy expression can also be applied to the classical system such as to find density of state etc.
2016-18	Loyola High School, CBSE, Patna, Bihar, 77.2% , Senior Secondary High Schooling [Physics, Chemistry, Mathematics, Informatics Practices, English]
2010-16	St. Paul's High School, ICSE, Patna, Bihar, 91.6%, High Schooling [Science, Mathematics, Computer App., Social Sci., Hindi, English]

Achievements

09/16	NTS Scholarship of merit, Government of India, New Delhi.
04/23	Qualified Graduate Aptitude Test in Engineering (GATE)-23, National Rank: 3409
02/20	Winner (Physics), InQuest 4.0, SCOSH [Student Chapter], SVNIT
03/20	Runner Up (Pratyaksha), Physics Club, SVNIT

Skills

Programme:	C, Python, MATLAB, Octave
Softwares:	LaTeX, MS Excel, MS Office, Mathematica
Web Design:	Basics of HTML5, CSS3, and use of GitHub.
Languages:	English (Working), Hindi(Native)

Research Experiences

[**See Research Transcript**]

[10] Date of completion: *Present* (Expected by May 2024)
Title: *Quantum and Classical Applications of Relativistic Relationship of Kinetic Energy and Momentum*
Guide: Dr Vikash K Ojha, SVNIT-Surat
Type: Master's Dissertation (Final)

[9] Date of completion: 04 Dec 2023
Title: *On the novel approach to Relativistic Quantum Mechanics-I*
Guide: Dr Vikash K Ojha, SVNIT-Surat
Type: Master's Dissertation-(Preliminary)

[8] Date of completion: 05 Jul 2023
Date of pre-print: 30 Oct 2023: OSF Preprints
Title: *Obtaining the Klein-Gordon wave equation without using the quantum operators*
Type: Article
DOI: **10.31219/osf.io/6hmyf**

[7] Date of completion: 19 Nov 2022
Title: *New light on the concepts of Observable and indeterminacy in the quantum realm*
Type: UG Project III, [Jul-Dec, 2022]

[6]Date of completion: 19 Nov 2022
Date of pre-print/publication: 08 Oct 2023: OSF Preprints
Title: *An open-ended story on quantization*
Type: Article
DOI: **10.31219/osf.io/92bvp**

[5]Date of completion: 17 Sep 2022
Date of pre-print/publication: 10 Oct 2023: OSF Preprints
Title: *Reviewing Observables in Classical and Quantum Mechanics*
Type: Article
DOI: **10.31219/osf.io/p2ufx**

[4] Date of completion: 17 Jul 2022
Title: *The pictures of quantum dynamics* [Hindi]
Type: Internship [May-Jul, 2022]

[3] Date of completion: 09 May 2022
Date of pre-print: 21 Sep 2022: arXiv Preprints
Title: *On the investigation of two non-neutral static bodies*
Type: UG Project II, [Jan-May, 2022]
DOI: **10.48550/arXiv.2209.10641**

[2]Date of completion: 20 Feb 2022
Date of pre-print/publication: 02 Oct 2023: OSF Preprints
Title: *The Coronal Heating Problem*
Type: Review Article
DOI: **10.31219/osf.io/63cag**

[1] Date of completion: 08 Dec 2021
Date of pre-print: 29 Sep 2023: OSF Preprints
Title: *Dynamics of Two Objects Considering the Minimum Total Potential Energy Principle*
Type: UG Project I, [Jul-Dec, 2021]
DOI: **10.31219/osf.io/ukx9t**

Technical Projects

06/21-07/21	Internship, *The front-end development of a dummy e-commerce website* - Learning included using HTML5, CSS3 frameworks and training for web designing.
07/21-12/21	Project, *Building the student information management system using C language* -Learning included using C languages and its application in file handling

Workshops & Webinars

07/21	*Quantum Fields, Geometry & Representation Theory*, ICTS-TIFR, Bangalore.
12/20	National workshop on *Data analysis using MS Excel*, BBD NITM, Lucknow.
08/20	National workshop on MATLAB *Tools And Applications*, BBD NITM, Lucknow.

Responsibilities & Positions

08/22-03/23	**Student Coordinator**: QUANTA Seminar Series, Department of Physics, SVNIT Surat
11/22-01/23	**Design-Infra Coordination Head**: *Manoj Memorial Night Cricket Tournament* (MMNCT) Annual cricket event, SVNIT Surat
10/21-07/22	**Joint Academic Affairs Secretary**: *Academic Affairs Council* SVNIT, Surat
03/21-07/22	**Co-convener/Co-head**: *Society for Cultivation of Science and Humanities* (SCOSH), Student Chapter, SVNIT Surat.
06/20-03/21	**Junior Graphic designer & Member**: *Society for Cultivation of Science and Humanities* (SCOSH) Student Chapter, SVNIT Surat
12/19-01/20	**Student Volunteer**: *Manoj Memorial Night Cricket Tournament* (MMNCT) Annual cricket event, SVNIT Surat
09/19-07/20	**Student Volunteer**: *Unnat Bharat Abhiyan* (UBA) SVNIT Surat

Talks & Books

02/07/23	`MaNoVighn`: Short Poetry Collections, Kindle, ASIN: B0C9Y7X1PG
01/09/21	`KālSanGharsha`: Short Poetry Collections, Kindle, ASIN: B09FC1XRPK
13/11/21	*Unification in Mathematics*, IntERAct Seminar series, AMHD, SVNIT-Surat

Selected Courses

Ph.D. *self-preparation* /Undone:	Relativistic Quantum Mechanics, Classical Field Theory, Canonical Quantization, Interacting Quantum fields, Path Integrals, General relativity I* & II, SUSY & Supergravity, Cosmology, String theory I & II, Constructive QFT*, Basics of Topology and Differential Manifold, Lie Groups & Lie Algebra*, Geometric Algebra*, Algebraic Geometry, Algebraic Topology, Groups & Representations, Differential Geometry, Geometric group theory.
University (Physics):	Quantum Field Theory I, Many-Body Physics and Relativistic Quantum Mechanics, Particle Physics, Nuclear Physics, Special Relativity, Quantum Mechanics I & II, Computational Physics(Python, Monte-Carlo), Computational Methods(MATLAB/Octave), Atomic and Molecular Physics, Electrodynamics, Statistical Mechanics, Astrophysics, Density Functional Theory, and Classical Mechanics.
Certifications:	A Course in Math History[Aug-Sep'21], Classical Electromagnetism[Aug-Dec'20], Learning Physics through Simple Experiments[Apr-Jun'20], The advanced course on Special Theory of Relativity[Jan-May'20], The basics of Quantum Mechanics[Aug-Nov'19] and The basics of Special Theory of Relativity[Jan'18-Mar'19]
Other:	QFT-II (Prof. Partha Mukhopadhyay, Oct-23-*Present*), Group Theory Methods in Physics (Prof. P. Ramadevi, through Youtube.com, Aug-Sep'23), Introductory Lectures on Topology and Differential Geometry for Physicists (Prof. Sunil Mukhi, through Youtube.com, Sep-Oct'23) TCSiON Career Edge - TCS, Mumbai [6-16th Apr'20], Life Skills for Engineers (L1), CEMCA & University of Hyderabad [Jan-Feb'20],

Other

I am enthusiastic and will listen to Mathematical beauty, Ancient history and philosophy, and social justice. My hobbies are Hindi Poetry, Graphic Designing, and writing articles. Additionally, I am venturing into various flavours of Geometric Algebra. Open to learning, failure and exploration.