SAMEER JAIN

Orcid ◇ LinkedIn

Phone: (+91) 7428686688 ◇ Email: Sameerjainofficial@gmail.com

EDUCATION

Dr. B. R. Ambedkar National Institute of Technology (NITJ) *July 2024*
Master of Science, Physics **CGPA: 8.51**
Relevant Coursework: Particle physics, Quantum field theory, Atomic and molecular spectroscopy, Plasma physics, Nuclear physics, Computational techniques, Quantum mechanics

Jiwaji University *June 2022*
Bachelor of Science **Percentage: 72.8%**
Relevant Coursework: Classical Mechanics, Electrodynamics, Thermodynamics, Statistical Mechanics, Quantum Mechanics, Solid State Physics, Calculus, Linear Algebra, Complex Analysis

RESEARCH INTERESTS

My research focuses on deepening the understanding of hadronic structures through generalized parton distributions (GPDs) and generalized transverse momentum distributions (GTMDs) using the light-front quark-diquark model (LFQDM). I analyze sub-leading twist GPDs and GTMDs, combining analytical and computational approaches to enhance theoretical models. Additionally, I am enthusiastic about theoretical physics and string theory, aiming to apply advanced machine learning techniques to uncover new insights into fundamental theories.

RESEARCH EXPERIENCE

Deciphering twist-3 GPDs in LFQDM [1] *Feb 2024 - Current*
Supervisor: Dr. Harleen Dahiya NITJ

- Obtained explicit expressions of twist-3 generalized parton distributions (GPDs) using the light-front quark-diquark model (LFQDM).
- Analyzed and solved equations to elucidate the partonic structure of hadrons, showing strong agreement with established literature.
- Results demonstrated consistency with previous studies, affirming the accuracy of the findings in the context of twist-3 effects in hadronic physics.

Unraveling sub-leading twist GTMDs of proton using LFQDM [2] *June 2023 - May 2024*
Supervisor: Dr. Harleen Dahiya NITJ

- Conducted analytical calculations for sub-leading twist generalized transverse momentum distributions (GTMDs) in the proton using the light-front quark-diquark model (LFQDM).
- Utilized Mathematica for computational analysis, verifying and extending hand-calculated results to explore the proton's internal quark dynamics.
- Presented this research as part of my Master's thesis defense, contributing to advancing the understanding of proton structure within the framework of Quantum Chromodynamics (QCD).

Molecular Dynamics: Simulation of Solar System *May 2023 - July 2023*
Supervisor: Dr. Sharat Chandra IGCAR

- *Investigated Three-Body Problem Dynamics*: Led a comprehensive exploration into the dynamics of the three-body problem within molecular dynamics simulations. Analyzed the influence of initial conditions on system behavior, enhancing the understanding of dynamical systems.
- *Fortran Code Development*: Created a robust Fortran codebase from scratch on a Linux-based OS, demonstrating strong programming skills in computational physics. Implemented and optimized numerical algorithms, including Verlet and velocity Verlet, for simulating complex molecular dynamics scenarios.
- *High Accuracy and Communication*: Achieved close alignment with experimental observations, with a maximum error margin of 10%, showcasing the accuracy and reliability of the computational model. Presented project results clearly and effectively, highlighting the precision and reliability of the developed computational model.

PUBLICATIONS

[1] S. Jain, S. Sharma, and H. Dahiya, "Deciphering Twist-3 Chiral-Even GPDs in the Light-Front Quark-Diquark Model," Aug. 2024. arXiv: 2408.07332 [hep-ph].

[2] S. Sharma, S. Jain, and H. Dahiya, "Unraveling sub-leading twist GTMDs of proton using LFQDM," Aug. 2024. arXiv: 2408.07716 [hep-ph].

PRESENTATIONS

POSTERS
"Study of the Sub-leading twist GTMD $E^{v}_{21}(x, p_{\perp}, \Delta_{\perp}, \theta)$ for proton in light-front quark-diquark Model"
National Science Day (NITJ) *Feb 2024*

ACHIEVEMENTS

Mukhyamantri Medhavi Vidyarthi Yojana (MMVY), awarded by Government of Madhya Pradesh *2019-2022*
Pratibhashali Vidhyarthi Protshahan Yojna (PVPY), awarded by Government of Madhya Pradesh *2018*

SKILLS/HOBBIES

Programming Languages Fortran, Mathematica, LaTeX
Hobbies Music, Stories

Last updated: August 16, 2024