Devansh Shukla

Five Years Integrated Masters of Science in Physics
Department of Physics
Sardar Vallabhbhai National Institute of Technology
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RESEARCH INTEREST

Investigation of General relativity and other modified gravity theories.

EDUCATION

2018 - 2023 **Five Years Integrated M.Sc. (Physics)** **[Gold Medal]** CGPA: 9.70/10
Department of Physics,
Sardar Vallabhbhai National Institute of Technology
Surat, India (svnit.ac.in)

COMPUTATIONAL SKILLS

Version control:	Git
Languages:	Python, C/C++, Fortran 95, Vue.js, Next.js
Software & Tools:	LaTeX, Mathematica, GNU Octave, WxMaxima, WIPL-D Pro, Altair-FEKO
Python Packages:	pytearcat, AstroPy, PoliAstro, Pandas, NumPy, SciPy, Matplotlib, SymPy, PoliAstro

PUBLICATIONS

Preprints

[1] **D. Shukla**, K. Pathak, "Neutral particle motion around a Schwarzschild-de Sitter Black Hole in f(R) gravity." arXiv, 2024. doi: 10.48550/ARXIV.2401.15795 [https://arxiv.org/abs/2401.15795]

[2] **D. Shukla**, A. M. A, and K. Pathak, "Orbital motion of a test particle around a Schwarzschild's Black Hole in STVG gravity." arXiv, 2022. doi: 10.48550/ARXIV.2211.02008 [https://arxiv.org/abs/2211.02008]

[3] **D. Shukla**, Y. Modi, and K. Pathak, "DESIGN OF A NOVEL VERTICALLY-STACKED KITE-SHAPED ANTENNA". TechRxiv, 19-May-2022, doi: 10.36227/techrxiv.19785499.v1. [10.36227/techrxiv.19785499.v1]

RESEARCH EXPERIENCE

2023-24 **Neutral particle motion around a Schwarzschild-de Sitter Black Hole in $f(\mathcal{R})$ gravity**
Advisor: Prof. Kamlesh Pathak
This project investigates the presence of a Schwarzschild-de Sitter solution in the metric constant-curvature f(R) gravity. It examines the horizons and existence conditions for near-extreme and hyper-extreme Schwarzschild-dS solution. Further, it computes the approximated solution to the innermost stable cirular orbit for a time-like particle around SdS solution. [https://arxiv.org/abs/2401.15795]

2023 **Master's thesis: Cosmology in $f(\mathcal{Q})$ gravity**
Advisor: Prof. Kamlesh Pathak
This project investigates in detail the motivations for a special modified gravity theory called the $f(\mathcal{Q})$ gravity. It represents a sharp departure from Einstein's general relativity due to its consideration of metric incompatibility and the torsion tensor. This work deals with computing the Friedmann's equation and developing a numerical solution to the dust evolution model.
[DissertationReport]

2022 **Orbital motion of a test particle in STVG gravity around a static spherically symmetric solution**
Advisor: Prof. Kamlesh Pathak
This project involved examining the existence of a static spherically symmetric solution in the Scalar-Tensor-Vector Gravity and developing an effective potential to compute the radius of the innermost stable circular orbit(ISCO) for timelike and lightlike trajectories. [https://arxiv.org/abs/2211.02008]

5-30th July 2021 **Summer Student: Hamburg International Summer School**
Particles, Strings & Cosmology [certificate]
Department of Physics, Universität Hamburg and DESY
Lessons on general relativity, QFT, modern topics in cosmology,
particles, string theory with some basic German culture and language courses.

12-23 July 2021 **International Summer School on The interstellar Medium on Galaxies from the Epoch of Reionization to the Milky Way** [ISM; certificate]

It included observational constraints and the interpretative tools and the theoretical frameworks used for studying the interstellar medium in galaxies from the epoch of reionization to contemporary Universe

7-18th June 2021 **Summer Student: Escape Summer School, LAPP** [certificate]
- The aim of the school was to provide theoretical and hands-on training on Data Science and Python development for Astronomers. [github.com/escape2020/school2021]

January 2021 **The 2020 University Physics Competition** [report; certificate]
- Earned bronze medal
- For computing trajectory and fuel required for Ion Thruster powered Space-craft from Earth to Saturn; utilized open-sourced repo PoliAstro for orbital calculations and a python script for fuel calculations.

June-Sept 2020 **SWANtenna20 - Antenna Design Challenge: Online** [certificate]
- Participated in SWANtenna20 conducted by TLC IUCAA, Pune.
- It involved simulating a novel design of dual orthogonal linear polarization antenna with effective radiative coupling over 50 MHz to 500 MHz.
- As a follow-up to this project, I was able to simulate a novel vertically stacked kite shaped antenna [techrxiv.19785499.v1]

November 2020 **Vela Pulsar: Dispersion measure and time period**
This project involved writing a python based analysis pipeline for computing the dispersion measure and the time period of the Vela Pulsar(PSR J0835-4510) using the data collected by the Ooty radio telescope. [Vela Analysis]

January 2020 **Hands-On Programme**
- Sky Watch Array Network, Raman Research Institute, India
- Hands-on experience with Murchison Widefield Array(MWA) at Gauribidanur Field Station(GBD), RRI, India.

March-May 2019 **SWAN Imaging Challenge: Online**
- Participated in the imaging challenge which involved making a 100 *sq deg* radio image of CAS-A from the data collected during late 2017 by the Sky Watch Array Network, RRI, India.

May-June 2019 **Visiting Student**
- Digital Signal Processing Lab, Raman Research Institute, Banglore, India
- **Advisor**: Prof. Avinash Deshpande

RELEVENT COURSES

- Mathematical intuition behind Special and General Relativity [certificate]
- General Relativity [HISS 2021]
- Special Relativity
- Cosmology [HISS 2021]
- Tensor Calculus
- Advanced Quantum Mechanics
- Quantum Mechanics
- Nuclear and Particle Physics
- Electrodynamics
- Electromagnetics
- Classical Mechanics

PERSONAL PROFILE

Date of Birth: 9^{th} February, 2001

Address: **Devansh Shukla**,
H.No. 269, Triveni Complex, Lajpatpura Ward, Sagar,
Madhya Pradesh, India(470 002).

Languages: English C1: IELTS Academic – 8.0
Deutsch A1.1: A1.1
Hindi

REFERENCE(S)

Prof. Kamlesh Pathak **Professor**,
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Sardar Vallabhbhai National Institute of Technology, Surat, India
Email: knp@phy.svnit.ac.in

Dr. Dimple V. Shah **Associate Professor**,
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