Sidhant Kumar Suar

University College London
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https://github.com/Sidvibn
https://sidvibn.github.io/

Education

University College London — 2024 - 2025
MSc. Astrophysics

University of Toronto — 2019 - 2023
BSc. (Hons) Physics and Astronomy (Graduated with High Distinction)
Minor: Mathematics

Research Interests

Planetary and Galactic Dynamics, Astrophysical Fluid Dynamics, High-Energy Astrophysics

Publications

Suar, S. K. & Millholland, S. C. "Planetary Obliquity Excitation Through Pre-Main Sequence Stellar Evolution", 2024, AAS Journals, *in review.*

Research Experience

Excitation of Planetary Obliquities through Planet-Star Interactions
Massachusetts Institute of Technology — November 2023 - Present
Supervisor: Prof. Sarah C. Millholland
Used N-body simulations and the secular evolution of a perturbative Hamiltonian to study how a pre-main sequence star affects the obliquity of a planet orbiting around the star.

Dynamics of the atmospheres of ultra-hot Jupiters
Imperial College London — August 2023 - Present
Supervisor: Prof. James E Owen
Initialized a hydrostatic, isentropic hot Jupiter atmosphere using a well-balancing method and studied its dynamics due to cooling and rotation using Athena++.

Listening to gas giant planets
University of Toronto — May 2023 - August 2023
Supervisor: Dr. Janosz Dewberry
Used time-dependent perturbative methods along with REBOUNDx to study the effects on the satellite Juno due to normal mode oscillations within Jupiter. We included the effects of the rotation of Jupiter on the oscillation modes and the satellite.

Probing the formation and evolution of white dwarf debris disks
University of Toronto — July 2022 - April 2023
Supervisor: Prof. Yanqin Wu
This project focused on studying the formation and evolution of white dwarf debris disks. The main objective was to predict the source of the incoming heavy metals that make up the circumstellar disk, thus understanding white dwarf pollution. I used a magnetohydrodynamics(MHD) simulation package Athena++ to probe the evolution of these disks based on certain theoretical models.

Electronic states coupled to complex magnetic orders
University of Toronto July 2022 - April 2023
Supervisor: Prof. Arun Paramekanti
This project focused on studying the possibility of Majorana Bound States (MBSs) in p-type and p_x+ip_y type superconductors coupled to antiferromagnetic skyrmion textures. I used the Bogoliubov-de Gennes (BDG) transformation, spiral skyrmion configurations, and numerical simulations to look for quasiparticle excitations; especially the zero energy modes also known as Majorana Fermions.

Characterization and performance testing of RFoF units for the CHORD telescope array
University of Toronto May 2022 - July 2022
Supervisor: Prof. Keith Vanderlinde
This project was based on testing and debugging the radio frequency (RF) transmitters and receivers that were connected using photodiodes and were designed in the form of printed circuit boards (PCBs). We measured various quantities to show that optical fibers were more efficient at signal transmission when compared to their counterparts; the coaxial cables.

Awards and Honours

CITA Summer Undergraduate Research Fellowship
University of Toronto April 2023
For conducting summer research under CITA.

Walter John Helm Scholarship in Astronomy and Astrophysics
University of Toronto December 2022
For the highest annual GPA during my junior year.

Innis College Alumni Association Scholarship
University of Toronto October 2022
For high academic achievement during my undergraduate studies.

Natalia Krasnopolskaia Summer Undergraduate Research Fellowship
University of Toronto May 2022
For conducting summer research under the Department of Physics.

Dean's List Scholar
University of Toronto June 2021 - June 2023
For high academic achievement during my undergraduate studies.

University of Toronto Scholar
University of Toronto October 2019
For high academic achievement in high school.

International Award for Young People (Bronze)
The Duke of Edinburgh's Award International Association March 2019
For community leadership during high school.

Conference Posters

Sidhant Kumar Suar, Dr. Janosz Dewberry, (August 2023). *Listening to gas giant planets.*
CITA Research Fair, University of Toronto

Sidhant Kumar Suar, Dr. Keith Vanderlinde, (October 2022). *Characterization and performance testing of RFoF units for the CHORD telescope array.*
SURF Undergraduate Research Fair, University of Toronto

Selected Conferences and Workshops

Canadian Astroparticle Physics Summer School
Queen's University May 2022
I was selected to attend a summer school on astroparticle physics. I learned about the detection and phenomenology of possible dark matter candidates.

Outreach

Volunteer Worker
People for Animals 2022-Present
I am a part of their awareness campaigns to ensure the safety of stray animals in our local neighborhoods.

AstroTours
University of Toronto 2022-2023
I volunteered in this program to demonstrate upper-level astrophysics topics to high school students.

Volunteer Mentor
Center of Integrated and Sustainable Development 2019-Present
I work towards women's empowerment, skill development, health, and hygiene. It has led to their economic growth and quality of life to ensure a sustainable ecosystem for rural entrepreneurship.

Volunteer Mentor
Kalinga Institute of Social Sciences 2017-Present
I contribute to the underprivileged indigenous students' academic learning and mental health.

Volunteer Worker
Bakul Foundation 2014-Present
I donate books to underprivileged children with the help of this NGO.

Programming Skills

Languages & Packages: Python, C++, Athena++, MESA/GYRE, REBOUND/REBOUNDx, TensorFlow/Keras, Wolfram Mathematica, HTML, CSS, LaTeX

Operating Systems: Windows, Linux (HPC), macOS