

# Sidhant Kumar Suar

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🐙 [github.com/Sidvibn](https://github.com/Sidvibn)

🌐 [sidvibn.github.io](https://sidvibn.github.io)

## Education

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**MSc University College London** 2024 - 2025

Astrophysics

**Honours BSc University of Toronto** 2019 - 2023

Physics and Astronomy Specialist, Mathematics Minor

*Graduated with High Distinction*

## Research Interests

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

## Publications

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

## Research Experience

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**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

Studied 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. 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 Paramakanti

Focused on the possibility of Majorana Bound States (MBSs) in p-type and  $p_x+ip_y$  type superconductors coupled to antiferromagnetic skyrmion textures. 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

Based on testing and debugging the prototypes (PCBs) of radio frequency (RF) transmitters and receivers connected using photodiodes. 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**

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### **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 Krasnopolaskaia Summer Undergraduate Research Fel-**

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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

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**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

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### Canadian Astroparticle Physics Summer School

Queen's University

May 2022

Selected to attend a summer school on astroparticle physics focused on the detection and phenomenology of possible dark matter candidates.

## Outreach

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### Volunteer Worker

People for Animals

2022-Present

Member of their awareness campaigns to ensure the safety of stray animals in our local neighborhoods.

### AstroTours

University of Toronto

2022-2023

Volunteered in this program to demonstrate upper-level astrophysics topics to high school students.

### Volunteer Mentor

Center of Integrated and Sustainable Development

2019-Present

Working 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  
Contributing to the underprivileged indigenous students' academic learning and mental health.

### **Volunteer Worker**

Bakul Foundation 2014-Present  
Donating books to underprivileged children with the help of this NGO.

## **Programming Skills**

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

**Operating Systems:** Windows, Linux (HPC), macOS