

# Sidhant Kumar Suar

University of Toronto

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## EDUCATION

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UNIVERSITY OF TORONTO

2019 - 2023

*BSc. (Hons) Physics and Astronomy (Graduated with High Distinction)*

THESIS: *Electronic states coupled to complex magnetic orders*

SUPERVISOR: Prof. Arun Paramekanti

THESIS: *Probing the formation and evolution of white dwarf debris disks*

SUPERVISOR: Prof. Yanqin Wu

## RESEARCH INTERESTS

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**Asteroseismology, Astrophysical Fluid Dynamics, Planetary Dynamics**

## RESEARCH EXPERIENCE

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### *Dynamics of the atmospheres of ultra-hot Jupiters*

Imperial College London

August 2023 - Present

*Supervisor:* Prof. James E Owen

Initialized a hydrostatic hot Jupiter atmosphere using a well-balancing method and studied its dynamics using Athena++. Currently looking at atmospheres with isothermal and isentropic conditions in particular.

### *Listening to gas giant planets*

University of Toronto, CITA SURF

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, and thus, understand white dwarf pollution. I used a magnetohydrodynamics(MHD) simulation package Athena++ to probe the evolution of these disks based on the theoretical predictions that we had made.

### *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.

## ***Characterization and performance testing of RFoF units for the CHORD telescope array***

University of Toronto, SURF

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**

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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 Krasnopskaia 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 my high school.

## **CONFERENCE POSTERS**

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**Sidhant Kumar Suar**, Dr. Janosz Dewberry, (August 2023). *Listening to gas giant planets.*

CITA Poster Presentations, University of Toronto

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

Undergraduate Research Fair, University of Toronto

## **SELECTED CONFERENCES AND WORKSHOPS**

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### **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

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### **AstroTours**

University of Toronto

September 2022

I volunteered in this program to show demos and talk about gravitational lensing to high school and university students.

## PROGRAMMING SKILLS

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**Languages/Packages:** Python, C++, Athena++, MESA/GYRE, REBOUND/REBOUNDx, MATLAB, HTML, CSS, LaTeX

**Operating Systems:** Windows, Linux, macOS