

# Nirmalya Brahma

✉ nirmalya.brahma@mail.mcgill.ca | 🌐 Website | 💬 INSPIRE HEP

## EDUCATION

### Ph.D. in Physics, McGill University

Thesis Advisor: Katelin Schutz

GPA: 4.0/4.0

Montréal, Canada

Sept. 2021 – May 2026

### MS in Physics, Indian Institute of Science

Thesis advisor: Chethan Krishnan

Thesis: *A Large- $N$  phase transition in a finite lattice gauge theory*

CGPA: 9.0/10.0 (Major CGPA: 9.3/10.0)

Bangalore, India

Aug. 2020 – Jun. 2021

### BS (Research), Major in Physics, Indian Institute of Science

Thesis advisor: Aninda Sinha

Thesis: *Bootstrapping Cosmological Correlators*

CGPA: 8.9/10.0 (Major CGPA: 9.3/10.0)

Bangalore, India

Aug. 2016 – Jun. 2020

## FELLOWSHIPS, AWARDS, AND HONORS

### FRQNT scholarship, Fonds de recherche du Québec

CA\$58,334/ US\$42,000 total value for 28 months

2024 – 2026

### HQP pooled resource competition, McDonald Institute

CA\$40,000/ US\$29,000 total value for 12 months

2022 – 2024

### TSI Graduate Fellowship, Trottier Space Institute

CA\$2,000/ US\$1,500

2021 – 2023

### Chennupati and Vidya Jagadish Visiting Scholarship, Australian National University

Three-month research internship in stellar nucleosynthesis (AU\$ 8500/ US\$ 5,600)

2019

### INSPIRE-SHE Scholarship, Department of Science & Technology, India

₹400,000/ US\$4,500 for a duration of 5 years

2016 – 2021

### Mamraj Agarwal National Award (Governor's Medal)

5th rank, WBCHSE Higher Secondary Exam 2016 ( $\approx 0.78$  million candidates)

2016

## PUBLICATIONS

Primary contributor or equivalent:

7. **Nirmalya Brahma**, Ella Iles, Hugo Schérer, Katelin Schutz (Sep 2025), *Resonant axion and dark photon production in magnetic white dwarfs*, arXiv:2509.07085.
6. **Nirmalya Brahma**, Saniya Heeba, Hugo Schérer, Katelin Schutz (July 2025), *Spectral Surgery in a Heat Bath:a finite-temperature guide to particle production for phenomenologists*, arXiv:2507.14277.
5. **Nirmalya Brahma**, Katelin Schutz (Oct 2024), *Photon conversion to axions and dark photons in magnetized plasmas: a finite-temperature field theory approach*, JHEP 12 (2024) 191, arXiv:2410.14771.
4. **Nirmalya Brahma**, Saniya Heeba, Katelin Schutz (Aug 2023) *Resonant pseudo-Dirac dark matter as a sub-GeV thermal target*, Phys.Rev.D 109 (2024) 3, 035006, arXiv:2308.01960.
3. **Nirmalya Brahma**, Asher Berlin, Katelin Schutz (Aug 2023) *Photon-dark photon conversion with multiple level crossings*, Phys.Rev.D 108 (2023) 9, 095045, arXiv:2308.08586.
2. **Nirmalya Brahma**, Chethan Krishnan (Dec 2020) *Large- $N$  phase transition in a finite lattice gauge theory*, Phys.Rev.D 103 (2021) 12, 126028, arXiv:2012.15857.
1. **Nirmalya Brahma**, Shiv Sethi, Shivnag Sista (Jul 2020) *Energy injection in pre-recombination era and EDGES detection*, JCAP 12 (2020) 034, arXiv:2007.06417.

## SEMINARS AND CONFERENCE TALKS

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Simons Foundation CCA PACMAN Seminar <i>"Axion and Dark Photon Emission from Magnetic White Dwarfs"</i>	New York, NY Nov 2025
The International Conference Dark Matter and Stars (ICDMS) <i>"Modified Axion and Dark Photon Emission from Magnetic Dispersion"</i>	Kingston, ON July 2025
Dark Side of the Universe (DSU) <i>"Axions from magnetized plasma: effects of plasma dispersion"</i>	Montréal, QC July 2025
Pheno Symposium <i>"Axions from magnetized plasma: effects of plasma dispersion"</i>	Pittsburgh, PA May 2025
McGill HEP Theory Journal Club Seminar <i>"Plasmon production of axions and dark photons in anisotropic plasmas"</i>	Montréal, QC Nov. 2024
61st Winter Nuclear and Particle Physics Conference (WNPPC) <i>"Photon-Dark Photon Conversion with Multiple Level Crossings"</i>	Bromont, QC Feb 2024
Pheno Symposium <i>"Dark photon conversion in the presence of multiple level crossings"</i>	Pittsburgh, PA May 2023

## SCHOOLS, WORKSHOPS, AND EXTERNAL TRAINING

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Berkeley Axion Workshop <i>Poster - "Resonance Rewritten: Magnetic Dispersion and Axion Emission Rates"</i>	Berkeley, CA May 2025
TASI: The Frontiers of Particle Theory <i>Attended summer school in theoretical particle physics at CU Boulder</i>	Boulder, CO 3-28 June 2024
GUINEAPIG Workshop, Université de Montréal <i>GeV and Under Invisibles with New Experimental Assays for Particles in the Ground</i>	Montréal, QC July 2023
Centre for Research in Astrophysics of Quebec Summer School on Cosmology <i>Hands-on experience with observational probes of cosmology</i>	Montréal, QC June 2022

## TEACHING EXPERIENCE

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### Teaching Assistant, McGill University

Topics in Classical Mechanics - PHYS 331	Winter 2025
Introductory Astrophysics - PHYS 320	Fall 2024
Particle Physics - PHYS 567	Winter 2024
Majors Quantum Physics - PHYS 346	Fall 2023
Topics in Classical Mechanics - PHYS 331	Winter 2023
Mechanics and Waves - PHYS 131	Fall 2022
The Milky Way Inside and Out - PHYS 183	Winter 2022
Astrophysics - PHYS 521	Fall 2021

## MENTORING EXPERIENCE

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### Graduate

Berkin Gürbüz, M.Sc. student at McGill University	2024 – present
Marlon Josue Rivera Valladares, M.Sc. student at McGill University	2024 – present

### Undergraduate

Ella Iles, B.Sc. student at McGill University <i>Co-supervised final year bachelor thesis</i>	2024 – 2025
Aditya Chugh, Trottier Space Institute SURA (2023) <i>Co-supervised 3 month internship project (University of Toronto → McGill University)</i>	May – Aug. 2023

## PROGRAMMING AND NUMERICAL SKILLS

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**Programming Languages:** Python, C, MATLAB, LaTeX

**Computational Packages:** Mathematica, FeynCalc, OriginPro, SciDavis, ImageJ, Lumerical FDTD

**Particle & Nuclear Physics Tools:** DRAKE, QEDark, DarkART, DarkCast, NucNet Tools, r-Java 2.0, TALYS

## PROFESSIONAL ACTIVITIES

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Journal referee: Journal of High Energy Physics (JHEP)

2025 – present

## EXTRACURRICULAR ACTIVITIES

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Volunteer, Dark Side of the Universe Conference July 2025

Volunteer, Astronomy on Tap (AoT) Montreal 2023 – present

Co-founder and Mediator, Thermal field theory journal club (McGill University) 2022-present

Mentor at Notebook Drive IISc 2017-2020