SNEHA NAIR

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EDUCATION

City University of New York, USA *Sept 2023- Present*
PhD/Masters Theoretical Astrophysics

McGill University, Canada *Sept 2018 - May 2022*
Honours Physics and minor Mathematics

Hawaii Preparatory Academy, USA *Aug 2014 - June 2018*
High-School Diploma, Summa Cum Laude

SKILLS

Languages:	English, Hindi, Patois (Jamaican Creole)
Programming:	Python, Java, HTML ,C#, C++, Latex (Overleaf), R, Matlab, Django, Fortran
Software & Tools:	CAD, Sketch-Up, CIAO, Linux, Bash, Word, Excel, PowerPoint, NASA JOVE

RESEARCH EXPERIENCE

City University of New York Graduate School, New York, USA *Sept 2023 - September 2025*
Researcher
- Currently working on large-scale cosmological simulations (HAGN and NH) using the Infinity Cluster supercomputer in France. This research focuses on investigating the magnetic draping effects on large galaxy clusters as they interact with both hot and cold cosmic filaments. Specifically, I aim to probe whether the magnetic moments of galaxies become aligned with their surrounding environments as they funnel through these cosmic filaments.
- My work primarily focuses on the interplay between the cosmic web and galaxy evolution, using both theoretical models and computational methods to study the effects of cosmic structure on galactic properties.
- Supervisor: Professor Charlotte Welker

City University of New York Graduate School, New York, USA *Sept 2023 - January 2024*
Researcher
- Conducted a short-term project investigating gravitational lensing, particularly focusing on developing innovative methods for more accurately measuring cosmic distances through the effects of microlensing.
- Developed extensive C++ code bases to aid in the reconstitution of images affected by microlensing, enhancing the precision of lensing measurements.
- Supervisor: Professor Matthew O'Dowd

ScopeSys, Vancouver, Canada *October 2022 - November 2023*
- Analyzed data produced by a unique single-molecule microscopy technology, CLiC, which allowed for the observation of individual reactions in real time. Focused on extracting time sequences and determining on/off rates for different materials, providing critical insights into reaction dynamics.
- Led the migration of the CLiC software from Matlab to a Python and Django-based platform, improving the accessibility and functionality of the data analysis tools for future research.
- Supervisor: Professor Sabrina Leslie and Doctor Romain Berti

McGill University, Montreal, Canada *Sept 2020 - September 2022*
Researcher
- Lead a first-author publication that identifies new Ultra-Luminous X-ray sources (ULXs) in NGC 4261, and conducting a comprehensive study of X-ray binaries hosted by globular clusters in the same galaxy. This work has been published in MNRAS.
- Utilized Chandra's X-Ray Database and 'CIAO' software to examine the characteristics of ULXs hosted by globular clusters in early-type galaxies such as NGC 4261 and NGC 1316, shedding light on the nature of these extreme environments.
- Supervisor: Professor Daryl Haggard and Dr. Kristen Dage

University of Montreal, Montreal, Canada *May 2020 - Sept 2020*

Summer Research Intern

- Investigated phase transitions in quantum materials, specifically aiming to identify Quantum Spin Liquid behavior. This research provided foundational insights into exotic states of matter.
- Collaborated with Oxford Instruments to design and develop enclosures using CAD software, ensuring the materials could be housed in a heat sink at milliKelvin temperatures for experimentation.
- Supervisor: Professor Andrea Bianchi

McGill University, Montreal, Canada *Sept 2018 - June 2019*

Lab Assistant/Researcher

- Developed technical expertise in testing circuit boards, maintaining lab equipment, and re-documenting outdated research records to facilitate smoother lab operations.
- Collaborated with Dr. Dallas Wulf on a project exploring the feasibility of conducting SETI-type searches using the CHIME telescope, with the aim of establishing baseline tests for future experiments in this area.
- Supervisor: Professor Matt Dobbs

PUBLICATIONS

1. **S. Nair**, et al, "The X-ray Point Source Population hosted by Globular Clusters in Elliptical Galaxy NGC 4261", 2022, Monthly Notices of the Royal Astronomical Society
2. K.C. Dage, A. Kundu, E. Thygesen , A. Bahramian, J.A. Irwin, D. Haggard, T.J. Maccarone, **S. Nair**, M.B. Peacock, J. Strader, S.E. Zepf, "Three Ultraluminous X-ray Sources in NGC 1316", 2021, Monthly Notices of the Royal Astronomical Society
3. J. Madhani, C. Welker, **S. Nair**, D. Gallego, L. Feliancos, "Cosmic Entanglement: planes of satellite galaxies trace environmental whirling gas streams in the cosmic web", 2024, Monthly Notices of the Royal Astronomical Society (in prepartion- to be submitted before the end of 2024)
4. **S. Nair**, Professor Charlotte Welker, "The effect of magnetic draping in hot and cold cosmic filaments in the Horizon AGN simulation", 2025, Master's Thesis. (in preparation)
5. **S. Nair**, Professor Daryl Haggard and Doctor Kristen Dage, "Globular Cluster X-ray Sources in NGC 4261", 2022, Honours Thesis.

TEACHING EXPERIENCE

1. **Adjunct Lecturer**: PHYS 1434 - Algebra Based Course in Electricity and Magnetism: Fall 2024
2. **TA**: PHYS1117 — Astronomy I: Fall 2024
3. **Adjunct Lecturer**: PHYS 2443 - Modern Physics: Winter 2025

COMMUNITY ENGAGEMENT, CONFERENCES AND WORKSHOPS

American Museum of Natural History Eclipse Volunteer *Winter 2024*

Volunteer Position

- Assisted in distributing eclipse glasses to visitors and providing educational support to young students and enthusiasts on the science behind solar eclipses. Helped to create a hands-on learning environment for participants, explaining key concepts such as solar and lunar cycles, the mechanics of eclipses, and their significance in astronomical research.

Doctoral and Graduate Students Council (DGSC) Member/Representative *Winter 2024*

Volunteer Position/Elected Position

- Actively advocated for the rights and well-being of students in my cohort, focusing on improving payment schedules, ensuring transparency in the grading of qualifying exams, and pushing for an open and equitable hiring process for new faculty and staff. Engaged in regular discussions and collaborations with other representatives to implement meaningful change.

Astronomy on Tap Organizational Assistant *Fall 2023 - Winter 2024*

Volunteer Position

- Played a key role in organizing public astronomy events by coordinating with speakers and managing event logistics.

Responsible for securing venues, scheduling talks, and promoting events to foster greater community engagement with astronomy.

Columbia Astronomy Public Outreach *Fall 2023*
Volunteer Position
- Facilitated outreach efforts by publicizing astronomy events to the broader public, including schools and institutions within the CUNY system. Assisted in notifying educational institutions and engaging community members outside of Columbia's astronomy network to expand participation and foster a broader interest in astronomy.

.Astronomy Conference 2023 - CCA Simons Foundation *Fall 2023*
Workshop
- Participated in networking and discussions with astrophysics professionals from diverse fields at this inclusive conference. Engaged in conversations on improving inclusivity and diversity within the field, while gaining insights from experts on the future of astrophysics.

CCA Simons Foundation LSST Workshop *Fall 2023*
Workshop
- Collaborated with experts in a hands-on workshop focused on the Large Synoptic Survey Telescope (LSST) data. Developed skills in data management, learned advanced tools for data analysis, and discussed key research opportunities presented by LSST data.

FRESCA Physics Tutor *Fall 2021*
Volunteer Position
- Provided tutoring assistance to first-year McGill students enrolled in introductory physics courses. Supported students in understanding fundamental physics concepts and problem-solving techniques, helping them build a strong foundation in their studies.

HONOURS, GRANTS AND AWARDS

National Science Foundation Research Fellowship *Sept 2024*
$35,000 USD
CUNY Research Foundation Summer Research Award *May 2024*
$3,500 USD
CUNY International Scholar Science Scholarship *Sept 2024*
$3,000 USD
CUNY Tuiton Fellowship *Sept 2024, January 2025*
$16,640 USD
CUNY Graduate Entrance Scholarship Fellowship *January 2024*
$10,000 USD
CUNY Graduate Entrance Scholarship Fellowship *September 2023*
$10,000 USD
CUNY Academic Excellence *September 2023*
$1,000 USD
CUNY Tuiton Fellowship *Sept 2023, January 2024*
$16,640 USD
Canada Industrial Research Assistance Program Grant (IRAP) *Nov 2022, Nov 2023*
$65,000 CAD
NSERC Science Undergraduate Research Award - McGill *Summer 2022*
$4,500 CAD
McGill Bursary Award *Fall 2021,Spring 2022*
$20,560 CAD
NSERC Science Undergraduate Research Award - UdeM *Summer 2021*
$5,500 CAD
McGill Bursary Award *Fall 2020, Spring 2021*
$20,560 CAD
Thomas Webb Marr Physics Distinction *May 2018*
$2,500 USD

RESEARCH INTERESTS

- Transient astrophysics – AGNs, galaxy statistics, gravitational waves, multi-messenger astronomy, supernovae, fast radio bursts
- Cosmology – large-scale structure, galaxy formation, dark energy & dark matter, cosmic inflation, CMB
- Computational astrophysics – simulations, forecast modeling, data-driven astronomy, machine learning applications, high-performance computing
- Observational astrophysics – sky surveys, instrumentation, spectroscopy, time-domain astronomy
- Extragalactic astrophysics – galaxy evolution, star formation rates, cosmic reionization, intergalactic medium

WORK EXPERIENCE

Zio's, Barrie, Canada *June 2024 - Aug 2024*
Waitress

The Boulevard Club, Toronto, Canada *June 2019 - Aug 2019*
Busboy

Macmillian Orchards, Ajax, Canada *June 2020 - Sept 2020*
Grocery Clerk

Barranco, Montreal, Canada *June 2021 - January 2022*
Dishwasher & Line Cook

Vandale, Montreal, Canada *June 2022 - August 2022*
Dishwasher & Line Cook

EXTRA CURRICULAR/ATHLETIC AWARDS

Fine Arts: Oil Painting, Linoleum Printing, Music Production, Animation, Pastels (oil, soft), Film Photography
Athletics: McGill Triathlon, Cross Country, Wrestling, Hiking, Canoeing,Surfing
Athletic Awards: Jamaican International Surf Scholar, Girl's Wrestling Most Valuable (2016,2017), Girl's Cross Country Most Improved(2017), BIIF Girl's Cross Country Champion, Girls 108 Pound 4th in State

REFERENCES

Daryl Haggard
McGill University, Research Supervisor
daryl.haggard@mcgill.ca

Sabrina Leslie
University of British Columbia, Research Supervisor
sabrina@scopesys.ca

Matt Dobbs
McGill University, Research Supervisor
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Andrea Bianchi
McGill University, Research Supervisor
andrea.bianchi@udem.ca

Fidel M. Vazquez
Barranco, Executive Chef and Owner
fidelvazquez@gmail.com