Pruthviraj (Pruthvi) Acharya

pruthvi.acharya.54@gmail.com Mississauga, Canada

My 8 years of research experience have had me delve into the exciting fields of atomic physics, astronomy, and Martian atmospheric studies. From simulating the Martian polar conditions to presenting complex concepts in front of a diverse audience, my journey reflects my dedication to scientific exploration. As a versatile researcher, I am committed to pushing the boundaries of knowledge and our understanding of the natural world.

Skills

Python *(Data analysis, Data Visualization, Image processing, Machine learning)* | **MATLAB**

UNIX *(Ubuntu and SHELL coding)* | **C++** | **MS Office Suite**

Integrated Software for Imagers and Spectrometers (ISIS) *(Processing raw orbital observations)*

Professional Experience

Graduate Researcher, *York University* 08/2020 – present

Toronto, Canada

- Automating image processing using Python and UNIX to improve processing efficiency and facilitate data analysis
  - Processing time reduced by up to 200%
- Employing automated techniques to process 2000+ Martian images within 3 days
- Classifying and categorizing 3000+ Martian images to monitor changes
- Train undergraduates students and delegate tasks for various projects
- Presenting and updating ongoing and finished projects in informal and formal settings
  - Informal: 1-on-1 meeting with co-authors and project supervisor
  - Formal: Invited talks and conferences
- Simulating Martian weather using a mesoscale model (1-10 km resolution)

Lead Physicist, *York University* 01/2020 – 04/2020

Toronto, Canada

- Designed and developed an antimatter containment unit.
- The project was developed for use in an undergraduate research course
  - Successfully detecting antimatter
- Effectively communicated complex physics ideas and terms to a group of 6 non-physics members
- Raised over $10,000 CAD for the project through sponsorships
  - Raised funds used to provide project critical research-grade equipment
- Simulated various aspects of the project using MATLAB and electrical systems
  - Simulated solenoid magnetic fields using MATLAB
  - Simulated the vacuum chamber using electrical systems

Undergraduate Reseacher (Maritan Polar Science), *York University* 01/2019 – 08/2020

Toronto, Canada

- Categorizing and classifying cloud observations
  - Updating and refining the Martian polar cloud database
- Monitoring the polar regions using various data sources

- Using new methods to formulate a mechanism for polar anomalies

Undergraduate Researcher (Observatory Assistant), *York University* 05/2016 – 09/2019
Toronto, Canada

- Presented complex astronomical ideas and concepts to the general public.
- Generated interest in astronomy through virtual and in-person events.
  - In-Person tours of groups up to 10 adults and kids
- Analyzed data using a UNIX-based software called IRAF
  - Analyzed 3000+ variable stars

Undergraduate Researcher (Lab Assistant), *York University* 05/2016 – 04/2017
Toronto, Canda

- Designed and developed various lab equipment for use in atomic research.
- Designed a spectrometer to test and verify the quality of newly purchased lasers.
  - Total value of $5000+ CAD

Publications

Revelations of interannual dune evolution from the swiftest aeolian system on Mars by MRO/HiRISE long-term monitoring, 2023
Icarus (Third Author)

Chojnacki, M, et al. "Revelations of Interannual Dune Evolution from the Swiftest Aeolian System on Mars by MRO/HiRISE Long-Term Monitoring." Icarus, 1 Nov. 2023, pp. 115863–115863, https://doi.org/10.1016/j.icarus.2023.115863. (In-Press)

Tracking the Northern Seasonal Cap Retreat of Mars using Computer Vision, *Icarus (First Author)* 2023

Acharya, P.J., et al. "Tracking the Northern Seasonal Cap Retreat of Mars Using Computer Vision." Icarus, vol. 390, Jan. 2023, p. 115295, https://doi.org/10.1016/j.icarus.2022.115295.

Polar Science Results from the Mars Reconnaissance Orbiter: Multiwavelength, multiyear insights, *Icarus (Fourth Author)* 2023

Landis, M E, et al. "Polar Science Results from Mars Reconnaissance Orbiter: Multiwavelength, Multiyear Insights." Icarus, 1 Sept. 2023, pp. 115794–115794, https://doi.org/10.1016/j.icarus.2023.115794. Accessed 24 Sept. 2023.

Solar-System-Wide Significance of Mars Polar Science, *NASA* 2020

Smith, I, Calvin, WM, Smith, DE et al. (177 more authors) (2021) Solar-system-wide significance of Mars polar science. Bulletin of the American Astronomical Society, 53 (4). ISSN 0002-7537,https://doi.org/10.3847/25c2cfeb.4db95c67

Tracking the Southern Seasonal Cap Retreat of Mars Using Computer Vision, *Icarus (First Author)*

Acharya et al., (In-Review)

Education

Ph.D. (Earth and Space Science), *York University* 09/2020 – present
Expected Graduation: August 2024 Toronto, Canada
Dissertation: Monitoring and Simulating the Polar Regions of Mars

Committee: Dr. Isaac B Smith (Supervisor), Dr. John E Moores, Dr. James Whiteaway

B.Sc (Physics and Astronomy), *York University* 09/2015 – 04/2020
Graduated from the Honors Stream Toronto, Canada

Conferences/Workshops

NASA Community Analysis Pipeline (CAP) and Mars Global Climate Model (GCM), *Workshop*
The workshop includes training on the Community Analysis Pipeline (CAP) and the NASA Ames Mars Global Climate Model (GCM), featuring lectures and hands-on sessions in the Science Managed Cloud Environment (SMCE).

Division of Planetary Sciences (DPS), *Seasonal Variations of the Cold and Bright Anomalies on the Northern Polar Layered Deposits of Mars*
Conference Presentation

Mars Atmosphere Modelling and Observations (MAMO), *Workshop, Various Topics*
Oral Presentation: Interannual Variations in the Retreat of the Northern Seasonal Cap of Mars using Computer Vision (2022)
Poster: Seasonal Variation of the Cold and Bright Anomalies on the Northern Polar Layered Deposits (2022)

Lunar and Planetary Science Conference (LPSC), *Various Topics*
Oral Presentation: Interannual Variations in the Retreat of the Northern Seasonal Cap of Mars using Computer Vision (2022)
Oral Presentation: Seasonal Variation of the Cold and Bright Anomalies on the Northern Polar Layered Deposits (2021)

American Geophysical Union (AGU), *Various Topics*
Poster: Using Computer Vision to Monitor the Recession of the Northern Seasonal Cap (2021)
Oral Presentation: Seasonal Variation of the Cold and Bright Anomalies on the Northern Residual Cap of Mars (2020)

Invited Talks

Mars Polar Teleconference, *Various Topics*
"Automated Tracking of the Southern Seasonal Caps of Mars using MARCI Data", Aug. 11, 2021.
"Monitoring the Northern Seasonal Cap of Mars using Computer Vision", Jun. 9, 2021.
"Seasonal Variation of the Cold and Bright Anomalies on the NPLDs", Aug. 08, 2020.

Internships

Visiting Graduate Student, 01/2023 – 03/2023
Le Laboratoire de Météorologie Dynamique (LMD) at Sorbonne Université Paris, France

- Explored the principles, methods, and applications of mesoscale models (1 - 10 km resolution)
- Conducted mesoscale simulations to replicate late-summer Martian polar conditions
  - Gained hands-on experience in setting up and executing simulations

- Stress testing models
  - Gained insight into the model's inner working and critical points

Community Service

54th Annual Meeting of the Division For Planetary Sciences, 10/2022 – 10/2022
Session Chair London, Canada

Science Conference for planetary science. Session chair for the Martian Atmospheric Models, Local to Global (Session ID 113)

NASA, *Executive Secretary, Panel Review* 12/2023 – 12/2023

- Facilitated efficient panel discussions by providing comprehensive note-taking and timekeeping services during synchronous review sessions.
- Coordinated with panel chairs and monitors, ensuring smooth communication and adherence to schedules.
- Assisted in logistical aspects of panel reviews, including real-time documentation and clarification of discussions for accuracy and compliance with confidentiality protocols.

Teaching Positions

Teaching Assistant (TA), *Various Subjects* 2020 – 2024

- Helping and delegating TA duties to fellow TA collegues
- Leading lab groups ranging from 10-15 undergraduate students (first and second year)
  - Non-STEM and STEM students
- Marking assignments and tests promptly and providing feedback, Invigilating exams
- Courses: SC/PHYS1421, SC/NATS1870, SC/PHYS1421, SC/NATS1570, SC/PHYS3070, SC/PHYS 1525