

Janvi Madhani

Curriculum Vitae

Ph.D. Student, Astrophysics

Personal Information

Name Janvi P. Madhani
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Education

Aug. 2020 – Present **Johns Hopkins University** *Baltimore, MD*
Ph.D. Student in Astrophysics
Expected Graduation: 2025
Aug. 2015 – April 2019 **University of Pittsburgh** *Pittsburgh, PA*
B.S. in Physics and Astronomy, Honors Degree, Magna Cum Laude

Publications

Nov. 2019 Observation of Eclipse Shadow Bands Using High Altitude Balloon and Ground-Based Photodiode Arrays
<https://arxiv.org/abs/1911.05841>
(Madhani et al. 2019)

Presentations and Talks

January 4-8, 2020 **235th Meeting of the AAS**
Honolulu, Hawaii
iPoster
Interactive poster presentation regarding publication about observation of eclipse shadow bands.
March 18-20, 2019 **Atacama Cosmology 'f2f' Meeting**
Princeton, NJ
Talk
Short "fire-slide" presentation about research in cosmic rays and fast radio bursts.
March 25, 2018 **Department of Physics and Astronomy Undergraduate Poster Session**
University of Pittsburgh, Pittsburgh, PA
Poster
Poster presentation about progress in shadow band research.
March 16, 2018 **Public Lecture**
Allegheny Observatory, Pittsburgh, PA
Talk
Public lecture in collaboration with co-authors about research progress in understanding shadow bands.
September 22, 2017 **Allegheny Observatory Open House Lecture**
Allegheny Observatory, Pittsburgh, PA
Talk
Opening talk of the open house about immediate findings from the data collected from the NASA eclipse project.

June 28, 2017 **Duquesne University's Summer Research Symposium**

Duquesne University, Pittsburgh, PA

Plenary Talk, Poster

Plenary talk for all symposium attendees along with a poster presentation, both about shadow band research.

October 13, 2016 **White House Frontiers Astronomy Night**

Allegheny Observatory, Pittsburgh, PA

Demo, Poster

In relation to the NASA eclipse project, demonstrated imaging and video payloads, ballooning equipment, and shadow band detection setup along with a poster presentation in the presence of White House dignitaries and NASA personnel.

Awards, Honors, and Funding

Dean's List

Fall 2015 through Spring 2019

NASA - Pennsylvania Space Grant Consortium Scholarship

Summer '17, Fall '17, Spring '18, Fall '18, Spring '19

Research Experiences

August 2021 - Present **Cosmology Large Angular Scale Surveyor (CLASS)**

Baltimore, MD

- Dr. Tobias Marriage (P.I.)
- Currently working on data selection and analysis with CLASS, a large angular scale cosmic microwave background (CMB) experiment looking for gravitational B-modes, at Johns Hopkins. Current role includes working in data selection – developing and optimizing post-demodulated data cuts which are then passed off to eventually be made into maps of the CMB, and data analysis – characterizing polarization from atmospheric effects on large angular scales. Previously, worked on cryogenic instrumentation.

Fall 2020 - July 2021 **Allegheny Observatory Parallax Catalogue**

Pittsburgh, PA

- Dr. David Turnshek (P.I.)
- Developed a program that catalogues parallaxes published by the Allegheny Observatory and matches them with the Yale Parallax Catalogue, SIMBAD, and the written notes of which photographic plates were used to calculate the parallax at the Allegheny Observatory in an effort to have one searchable database of stars (specific to the observed Allegheny Observatory parallaxes) that gives the full history of its original observation along with any currently known information.

Spring 2019 - April 2020 **Developing A Theoretical Cosmological Model**

Pittsburgh, PA

- Dr. Arthur Kosowsky (P.I.)
- Tested Dr. Fulvio Melia's theoretical cosmological model that proposes a scale factor of the universe, $a(t)$, that increases linearly with time, rather than exponentially, as is argued for in standard Λ CDM cosmology. If Melia's model is true, then there would undoubtedly be consequences on the power spectrum of the Cosmic Microwave Background. Since this power spectrum is very precisely measured and observed, I worked on analytically and computationally testing his model for credibility against what has been measured and deduced from standard cosmology.

Sept. 2016 - Nov. 2019 **NASA Eclipse Ballooning Project**

Pittsburgh, PA

- Dr. David Turnshek (P.I.), Dr. Russell Clark, Lou Coban, Dr. Sandhya Rao, Dr. Jeffery Viperman, Sinjon Bartel, Grace Chu, Carlos Vazquez Gomez, Marshall Hartman

- Studied the phenomenon of shadow bands by means of a high altitude balloon during the 2017 total solar eclipse. Designed and created a shadow band simulator for use in lab, five photodiode circuits for use in balloon and on the ground and analyzed eclipse data in search of shadow bands in the upper atmosphere. Developed strong skills in mechanical and electrical engineering, programming, and signal processing. Led the publication presenting our results in which I conclude that some component of shadow bands were detected above the atmosphere.

Spring 2018 - Spring 2019 **Searching for Fast Radio Bursts in Atacama Cosmology Telescope Data**
Pittsburgh, PA

- Dr. Arthur Kosowsky (P.I.)
- Developed software (written in Python) to automate the process of sorting through data recorded as glitches in order to identify possible candidates for Fast Radio Bursts (FRBs) in the microwave wavelength, and thus, constrain their origin. Successfully developed a pipeline to differentiate cosmic rays from glitch data. As we learn the interactions between cosmic rays and our detectors better, we will be able to further narrow down candidates for FRBs. This project is in collaboration with the Atacama Cosmology Telescope time-domain team at Princeton and Cornell University. Much of this pipeline can be found on my Github.

Teaching

Fall 2020 **Teaching Assistant for General Physics for Bio Majors I**
Johns Hopkins University, Baltimore, MD
Prof. Tobias Marriage

Fall 2020 **Teaching Assistant for General Physics Lab I**
Johns Hopkins University, Baltimore, MD
Prof. Reid Mumford

Fall 2018 - April 2020 **Tutor in the Dept. of Physics & Astronomy**
University of Pittsburgh, Pittsburgh, PA

Fall 2018 **Undergraduate Teaching Assistant for Quantum Mechanics I**
University of Pittsburgh, Pittsburgh, PA

Outreach

Public Outreach

January 17, 2020 **Volunteer and Panel Speaker for CUWiP**
Allegheny Observatory, Pittsburgh PA

- Volunteered for the Conference for Undergraduate Women in Physics (CUWiP) hosted by the University of Pittsburgh and Carnegie Mellon University. Primary responsibilities involved giving tours of the Allegheny Observatory and speaking on panels to share my experiences in research.

October 2016, 2017, 2018, 2019 **Volunteer at Allegheny Observatory Open House**
Allegheny Observatory, Pittsburgh PA

- Volunteered the night of the open house each year of my undergraduate career to talk about general physics and astronomy and show demonstrations to the Pittsburgh community.

January 30, 2019 **Science Research Panel Speaker – Internship Week**
University of Pittsburgh, Pittsburgh PA

- Invited as a speaker on a panel, to share my undergraduate research experiences, by the Dietrich School of Arts and Sciences.

Recorded Outreach

August 21, 2017 **Live Radio Interview with P.J. Maloney of KQV AM 1410**
Pittsburgh, PA

- Radio interview discussing the total solar eclipse and launching a high altitude balloon from the path of totality.

Skills

Programming

Python, Raspberry Pi, Arduino, \LaTeX

Tools & Software

Git, MIRA (scientific image processing software), Matlab, SolidWorks

Professional Organizations

Member of American Physical Society (APS)

Member of Society of Physics Students

Languages

English *Fluent*

Gujarati *Fluent*

Hindi *Fluent*

French *Conversational*

Sanskrit *Read and Write Only*