Janvi Madhani

Curriculum Vitae Ph.D. Student, Astrophysics

	Personal Information
Name	Janvi P. Madhani
Date of Birth	March 7, 1997
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Github	janvimadhani
	Education
Aug. 2020 – Present	Johns Hopkins University Baltimore, MD
	Ph.D. Student in Astrophysics
A	Expected Graduation: 2025
Aug. 2015 – April 2019	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
	(Madhani et al. 2019)
	Presentations and Talks
June 12 - 16, 2022	240th Meeting of the AAS
	Fasadena, CA Talk
	Cave a talk about the formation of planes of dwarf galaxies around Milly Way type best
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March 25, 2018	Department of Physics and Astronomy Undergraduate Poster Session University of Pittsburgh, Pittsburgh, PA Poster Presented a poster about progress in shadow band research.
March 16, 2018	Public Lecture Allegheny Observatory, Pittsburgh, PA Talk Gave a 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 Gave a 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.
	Press Coverage
June 14, 2022	Press Conference at AAS 240 Pasadena, CA
August 16, 2017	 Gave a press briefing at the AAS 240 meeting to announce scientific results that reconciled a small scale tension with our model of cosmology. Recording can be found here. Shadow Bandits Ready for Eclipse Day Pittwire, University of Pittsburgh Click to read!
July 15, 2017	It's up, up and away Bob Batz, Pittsburgh Post-Gazette Click to read!
	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
	AAS FAMOUS Travel Grant January 9, 2022 - January 14, 2022
	Research Experiences
June 2021 - Present	 The Formation of Planes of Dwarf Galaxies Space Telescope Science Institute & Johns Hopkins, Baltimore, MD Or. Susan Kassin (P.I.), Dr. Charlotte Welker (Co.I)

My current research is investigating if the formation of thin planes of satellite galaxies around Milky Way type galaxies are due to motions of dwarf satellites along the cosmic web, the filamentary large scale structure of the Universe. We see these planes ubiquitously around local galaxies the Milky Way, M31, and Centaurus A, but thus far, have not not been able to recover them in simulations. This leads to considerable tension with the Lambda Cold Dark Model of the universe. However, we argue that previous simulations were missing both the large cosmic volume (> 10 Mpc³), required to model cosmic filaments along with small scale resolution (< 100 pc) required to resolve dwarf satellites, in order to properly describe the cosmic web – satellite interaction. I use the New Horizon simulation, a hydrodynamic, cosmological zoom-in simulation, with volume 16 Mpc³ and spatial resolution 35 Mpc, that satisfies the requirements to properly describe the web – satellite interaction. Our preliminary results indicate this interaction to be the driver behind the evolution of these thin planes.

August 2021 - Present Cosmology Large Angular Scale Surveyor (CLASS) Johns Hopkins, Baltimore, MD

- Dr. Tobias Marriage (P.I.)
- Worked on data selection and analysis with CLASS, a large angular scale cosmic microwave background (CMB) experiment looking for gravitational B-modes, . 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

- University of Pittsburgh, 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

Univerity of Pittsburgh, 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

University of Pittsburgh, Pittsburgh, PA

- Dr. David Turnshek (P.I.), Dr. Russell Clark, Lou Coban, Dr. Sandhya Rao, Dr. Jeffery Vipperman, 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 Searching for Fast Radio Bursts in Atacama Cosmology Telescope Data

2019 University of Pittsburgh, Pittsburgh, PA

• Dr. Arthur Kosowsky (P.I.)

o 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

August 22 - 26, 2022	Astro Scholars Computing Course Johns Hopkins University & Space Telescope Science Institute, Baltimore, MD Designed and will teach a week-long introductory Python course to students in the As- tro Scholars (see below) program who come from nontraditional and underrepresented backgrounds from the Baltimore and D.C. area.
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
	Mentorship and Advising
January - February 2022	Mentored Catherine Franklin Johns Hopkins University, Baltimore, MD Catherine is a local high school student who works with a graduate student in my research group to learn about astronomy research. I mentored her over the course of a month by teaching her Python programming. We covered everything from data types, basic calculations with Numpy and Scipy, control flow and iteration, arrays and data visualization to more astronomy specific things like FITS files, Astropy, and Pandas dataframes.
June 2021 - Present	Mentored Angela Wroblewski Johns Hopkins University, Baltimore, MD I co-advise Angela, an undergraduate student at the University of Maryland, in her project which analyzes the degree of co-rotation of satellites that form a plane around a Milky Way type system in the New Horizon simulation. Her project will inform observers whether the cosmic web dynamics we infer from these planar alignments in simulations are significantly visible to observers.
	Outreach

Scientific Outreach

January 17, 2022 - Astro Scholars January 21, 2022 Johns Hopkins University & Space Telescope Science Institute, Baltimore, MD

	• Astro Scholars is a week-long interactive mini-course in astrophysics, research in astrophysics, and computer programming, led by PI Susan Kassin. I joined the education team and admissions committee in Fall 2021 and developed the curriculum for a one week intensive course in Python that I will teach this late summer. This program begins with a a one-week immersive school in research, programming, and basic astrophysical concepts, and continues with tailored mentoring and monthly group meetings. Astro Scholars is held every year for 10 college students recruited from local minority serving institutions and underrepresented groups from other institutions (underrepresented minorities, women, LBGTIQ, first generation, disabled, and neurodiverse). Click to visit website!
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.
	Public Outreach
May 2-4, 2022	Congressional Visits Day Washington D.C.
	• Chosen to advocate for science and research funding on behalf of the AAS (American Astro- nomical Society) at congress. Met with members of congress from my state, Pennsylvania, along with those from New Jersey and Massachusetts.
October 2016, 2017, 2018, 2019	Volunteer at Allegheny Observatory Open House Allegheny Observatory, Pittsburgh PA
January 30, 2019	 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. 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, bash, FORTRAN, Raspberry Pi, Arduino, LATEX
	Tools & Software
	Git, MIRA (scientific image processing software), Matlab, SolidWorks
	Professional Organizations

Member of American Astronomical Society (AAS) 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*