Tanveer Karim

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Education

Expected 2023	PhD in Astrophysics	Harvard University
2019	AM in Astrophysics	Harvard University
2017	BS in Physics & Astronomy	University of Rochester

Astrophysics Experiences

2017 – Present — Harvard University

As a National Science Foundation (NSF) Graduate Research Fellow working with Dr. Daniel Eisenstein and Dr. Douglas Finkbeiner, I currently participate in the in the Dark Energy Spectroscopic Instrument (DESI) experiment collaboration to

- develop a robust cross-correlation pipeline to analyse cross-correlations between emission-line galaxies (ELGs) map and CMB lensing maps to constrain cosmological parameters of interest such as sum of neutrino masses as well as test theories of modified gravity
- quantify and develop mitigation procedures for imaging systematics affecting cross-correlation measurements
- implement Gaussian Process-like approaches and write software to clean stellar and galaxy spectra from contaminants
- validate empirically what target selection algorithms would be most useful to select ELGs to meet DESI's scientific goals

2016 – 2017 — Maria Mitchell Observatory

As an NSF-funded summer Researcher Experiences for Undergraduate (REU) intern to Dr. Andrew Fox, I led a project on the Southern Fermi Bubble, a structure of the Milky Way, and I

- identified new high-velocity clouds (HVCs) within the Bubble as well as measure their velocity and ionization properties,
- analysed the kinematic property of the HVCs to detect a velocity gradient within the Bubble, indicating a close relationship between the the Bubbles and the HVCs

2013 – 2016 University of Rochester

As an undergraduate research assistant and REU intern to Dr. Eric Mamajek, I led a project on the Galactic Coordinate System and I

- estimated the location of the North Galactic Pole based on latest data and improved its precision by a factor of ~ 10,
- introduced a new definition of the Galactic Coordinate System,
- developed a model to measure solar height relative to the Milky Way plane based on the new Galactic Coordinate System

2015 – 2016 Vanderbilt University & Cerro Tololo Inter-American Obseratory, Chile

As an NSF-funded REU intern to Dr. Cesar Briceño and Dr. Keivan Stassun, I led a project on the T-Tauri star population in the Orion OB1 Association and I

- measured and classified rotation periods of 2000 T-Tauri stars using various periodogram and wavelet algorithms,
- characterized the brightness variability of these stars,
- verified theoretical models pertaining to the evolution of stellar angular momentum evolution as a function of stellar age

Additional Research Experiences

2016 – 2017 Stanford US-Russia Forum

As a US delegate, I participated in the Stanford US-Russia Forum, a Stanford University-led initiative dedicated to fostering better relationship between the US and Russia, where I

- investigated issues that hinder scientific collaboration between the two countries,
- identified new promising research areas for collaboration,
- presented findings to Russian and US policymakers in Moscow, Russia and in Stanford, CA respectively.

2016 – 2017 University of Rochester

As a Take Five Scholar, I conducted a year-long independent study on the topic *Muslim Characters in Russian Literature* under Dr. John Givens where I

- extensively read and critically analysed writings of Muslim, Caucasian and Russian writers from the Russian Empire and Soviet Union, focusing on depiction of Muslim characters,
- wrote a senior thesis titled *From Circassia to Chechnya: Depiction of the Caucasus through the lens of Tolstoy* , analyzing how Tolstoy's portrayal of the Caucasian War contrasted with that of Caucasian writers of the same period.

Selected Honors and Awards

2019	National Science Foundation Graduate Research Fellow
2015 – 2017	Take Five Scholar: selective tuition-free one year scholarship provided to undergraduates at the University of Rochester to pursue a topic outside the student's major. Topic: "Muslim Characters in Russian Literature"
2016	Goldwater Scholar: highly selective federal scholarship awarded to approximately 200 students annually who show exceptional promise of becoming the next generation of research leaders in STEM fields
2015	National Society of Physics Students Leadership Scholarship: awarded annually to 12 students who exhibit high scholarship performance and exhibit the potential and intention for continued scholastic development in physics
2015, 2016	President's Award for Undergraduate Research: the highest undergraduate research award at the University of Rochester
2013 – 2016	Continuing Student Scholarship: highly selective scholarship awarded to approximately 30 students annually to recognize the outstanding achievements of University of Rochester students

Teaching

2013 - 2020	Teaching assistant for four courses at the University of Rochester and two courses at Harvard University, as well as an instructor for two mini-courses for the Banneker Institute summer students at Harvard University, with experience designing curriculum, lecturing and grading.

Journal Publications

7. Raichoor, A., et al., “Preliminary Target Selection for the DESI Emission Line Galaxy (ELG) Sample", RNAAS 4, 180, 2020.
6. **Karim, T.** et al., “Validation of Emission-Line Galaxies Target Selection Algorithms for the Dark Energy Spectroscopic Survey Using the MMT Binospec", MNRAS 497, 4587, 2020.
5. Ashley, T. et al., "Mapping Outflowing Gas in the Fermi Bubbles: A UV Absorption Survey of the Galactic Nuclear Wind", ApJ, 898, 128, 2020.
4. **Karim, T.** et al., “Probing the Southern Fermi Bubble in Ultraviolet Absorption Using Distant AGNs", ApJ 860, 98, 2018.
3. **Karim T.** & Mamajek,“Revised Geometric Estimates of the North Galactic Pole and the Suns Height Above the Galactic Midplane", MNRAS, 465, 472, 2017.
2. **Karim, T.**, Paramanova, K., Stepanova, D., “The Hidden Potential of University-level Science and Technology Collaborations between the US and Russia", The Stanford US-Russia Forum Research Journal, Vol. VIII, 1, 2017.
1. **Karim, T.** et al., “The Rotation Period Distributions of 4-10 Myr T Tauri Stars in Orion OB1: New Constraints on Pre-main-sequence Angular Momentum Evolution", AJ 152, 198, 2016.

Selected Talks & Posters

Invited

4. **Karim T.**, “Angular cross-correlation of Planck CMB lensing with DESI-like emission-line galaxies in Legacy Surveys", Carnegie Mellon Cosmology Seminar, talk, 2021.
3. **Karim T.**, “Successes and Outstanding Problems of 21st Century Cosmology Experiments", Beacon Hill Seminars, talk, 2020.
2. **Karim T.**, “Problem of the Model Minority Stereotype in Sciences & Affirmative Action", Banneker Institute Summer Talks, Harvard University, talk, 2019.
1. **Karim T.**, & Lerner, A. M., “Rethinking Academic Collaboration: Encouraging Exchanges in the Sciences and Humanities", Fort Ross Dialogue, talk, 2017.

Contributed

4. **Karim, T.** & Eisenstein, D. J., "Results from the Binospec Study: A Case for Sliding Cuts for ELG Target Selection" DESI Collaboration Meeting, talk, 2019.
3. **Karim, T.**, Lee, J. H., Eisenstein, D. J., "ELG Target Selections in DESI", Understanding Emission-Line Galaxies Meeting, poster, 2018.
2. **Karim, T.** et al., "Probing the Southern Fermi Bubble in Ultraviolet Absorption", AAS Meeting 229, talk, 2017.
1. **Karim, T.** et al., "Measuring the rotation periods of 4-10 Myr T-Tauri stars in the Orion OB1 association", AAS Meeting 227, poster, 2016.

Selected Service, Leadership & Outreach Experiences

2021 – Present	DESI DEI Committee: As a member of the Diversity, Equity and Inclusion (DEI) committee of the Dark Energy Spectroscopic Instrument (DESI) Collaboration, I help organize DEI related activities in the collaboration, specifically focusing on designing and analysing survey questionnaire sent out the collaboration at-large.
2020 – Present	RESPOND Crisis Translation: As the project manager of the Bangla translation team, I manage a team of 15 volunteers to offer pro bono translation service to immigrants, refugees and asylum seekers as well as immigration-based non-profits.
2019 – Present	DESI Outreach Commitee: As a member of the DESI outreach committee, I helped develop curriculum and organize events to offer hands-on tutorial on how to do cosmology research for high school students and I also help with translating the DESI website into Bangla.
2018 – 2019	Banneker Institute, Harvard University: As an instructor for this summer program geared towards students from underrepresented background, I taught them courses on the celestial coordinate system and public speaking.
2018 – 2019	Equity & Inclusion Journal Club, Harvard University: As an organizer, I maintained the website of the journal club and helped identify speakers to give talks on various aspects of diversity and identity that pertain to astronomy and astrophysics as a field as well as the broader society.

Additional Skills

Programming Languages	Python (numpy, scipy, matplotlib, pandas, scikit-learn), C and R
Languages	Bengali (native), English (native), Russian (intermediate), Hindi (conversational), Persian (elementary)