

MANISHA SHRESTHA

Denver, CO— mshrest9@du.edu— 660-234-4435

EDUCATION

University of Denver

Ph.D. in Physics

GPA 3.95/4.0

Dissertation: Polarized bow shocks reveal features of the winds and environments of massive stars

Denver, CO

August 2018

Truman State University

BS in Physics, Minor in Mathematics

GPA 3.69/4.0

Kirksville, MO

Spring 2012

RESEARCH INTERESTS

- Computational astrophysics including radiative transfer and hydrodynamic simulations
- Stellar wind properties of stars
- Dust properties of interstellar medium
- Impacts of stellar properties of planet formation
- Polarization by electron and dust scattering to study the environment around stars and planets

RESEARCH EXPERIENCE

Liverpool John Moores University

Postdoctoral Research Assistant

Advisor: Dr. Iain Steele.

- Modify pipeline software to handle new instrument
- Analyze results of polarization data of gamma ray bursts

Liverpool, UK

Starting November 2018

University of Denver

Postdoctoral Research Assistant

Advisor: Dr. Jennifer L. Hoffman.

- Model environment around colliding wind Wolf-Rayet binaries
- Analyze results of polarization simulations of bow shock by dust scattering

Denver, CO

Summer 2018 - Present

University of Denver

Graduate Research Assistant

Advisor: Dr. Jennifer L. Hoffman.

- Add density structure from smooth particle hydrodynamic models to study polarization behavior
- Select bow shock candidates for observation and observe from DUSTPol
- Simulate model grid for different parameters of bow shock for dust scattering
- Simulate model grid for different parameters of bow shock for electron scattering
- Add stellar wind bow shock density structure in a Monte Carlo Radiative Transfer code
- Mentored undergraduate student to conduct observation of bow shock candidates

Denver, CO

Fall 2012 - Summer 2018

Truman State University

Undergraduate Research Assistant

Advisor: Dr. Michael Goggin

- Studied down conversion in biaxial crystal

Kirksville, MO

2011-2012

TruScholars Summer Undergraduate Research

Advisor: Dr. Matthew Beaky

- Observed candidate of delta Scuti pulsating star using Truman State Observatory
- Analyzed the light curves to identify delta scuti eclipsing binaries from the *Kepler* database

Summer 2011

Advisor: Dr. Matthew Beaky

- Studied O'Connell effect in eclipsing binaries

2009-2010

GRANTS

- AAS international travel grant 2018
- Dissertation Fellowship, University of Denver (\$2500) 2016-2017
- American Astronomical Society FAMOUS travel grant (\$500) 2016
- Doctoral Fellowship for Inclusive Engagement, University of Denver (\$3000) 2015-2016
- AAS international travel grant 2015
- Sigma Xi research grant (\$2495) 2014
- NSM Dean's Doctoral Fellowship, University of Denver 2012-2013

TEACHING AND MENTORING EXPERIENCE**University of Denver**

Denver, CO

*Graduate Teaching Assistant*21st Century Physics and Astronomy: for non-science majors

2016-Present

- Provide a short lecture before the hands on part
- Guide students through hand on astronomy and physics experiments both in the lab and outdoor labs
- Hold office hours and provide support at help desk
- Grade lab reports, pre-labs, homework and exams
- Develop new lab experiments to provide observational and data reduction opportunity to students

General Physics: algebra based physics for science majors

2014-2015

- Taught labs, held office hours and answered questions at help desk
- Graded lab reports, pre-labs, homework and exams

Mentored undergraduate students

Denver, CO

- Advised Austin A. Lin in his senior thesis project *Polarization observation of the unresolved bow shock of HD 230561* 2017-2018
- Helped several undergraduate students in Dr. Jennifer L. Hoffman's group with Python Programming and physics concepts 2017-2018

Kathmandu Astrophysics School 2018

Pokhara, Nepal

- Volunteered as junior lecturer for a 8 days long summer school, gave lectures on stellar physics, provided mentorship to students, engaged in student selection process 2018

University of Denver SciTech - Camp

Denver, CO

- Ran DU SciTech - Camp for middle school girls along with professors and other graduate students

2016 & 2017

Truman State University

Kirksville, MO

Undergraduate Teaching Assistant

2009-2010

- Graded homework and quizzes for undergraduate introductory class

Physics Tutor

2009-2012

- Provided group tutoring for undergraduate physics students

AWARDS and HONORS

- Outstanding student paper, Four Corners Section meeting, Fort Collins 2017
- Teaching Excellence Award, Natural Science and Mathematics, University of Denver 2016-2017
- American Association of Physics Teachers, Outstanding Physics Teaching Assistant 2015
- Outstanding Graduate Teaching Assistant, Department of Physics and Astronomy, University of Denver Winter 2015
- Invited to attend the national Supercomputing conference 2014
- Honorable Mention, poster competition, Rocky Mountain High-Performance Computing Symposium 2014
- President's Honorary Scholarship Fall 2008 - Spring 2012

- Sigma Pi Sigma (Physics Honor Society) Spring 2010 - Present
- Dr. Robert Peavler Memorial Scholarship 2011 - 2012
- Dean Earl and Edna Ludlo Foundation Scholarship 2010 - 2011
- Bishal Memorial scholarship 2005 - 2006

PROFESSIONAL AFFILIATIONS

- Member, American Astronomical Society (Present)
- Member, American Physical Society (Present)
- Member, Sigma Xi (Present)
- President, Women in Physics Club at Truman State University (2012)

PUBLICATIONS

M. Shrestha, H.R. Neilson, J.L. Hoffman, R. Ignace, Polarization simulations of stellar wind bow shock nebulae . I. The case of electron scattering, *MNRAS*, Volume 477, Issue 1, 1365-1382, 2018

M. Shrestha, and J.L. Hoffman, Polarization Signatures of Bow Shocks in Stellar Winds, *EAS Publications Series*, 71-72, 2015

INVITED TALKS

M. Shrestha, “Polarization of stellar wind bow shocks”, *Colloquium, Department of Physics and Astronomy*, Colorado College, CO, May 11, 2018

M. Shrestha, “Polarized bow shocks reveal features of the winds and environment of massive stars”, *Colloquium, Department of Physics and Astronomy*, Max Planck Institute of Solar Research, Gottingen, Germany, April 26, 2018

M. Shrestha, “Polarization study of stellar wind bow shock nebulae to understand the properties of environment of massive stars”, *Colloquium, Department of Physics and Astronomy*, University of Wyoming, Laramie, CO, March 23, 2018

M. Shrestha, “Polarization Signatures of Stellar Wind Bow Shocks”, *Stars and planets group meeting*, University of Toronto, Toronto, Canada, February 19, 2016

M. Shrestha, “Polarization Signatures of Stellar Bow Shock”, *Colloquium, Department of Physics & Astronomy, East Tennessee State University*, Johnson City, TN, March 16, 2015

M. Shrestha, “Understanding the Relation of Progenitors and Supernovae Through the Study of Circumstellar Materials”, *Colloquium, Department of Physics & Astronomy*, University of Denver, CO, March 27, 2013

CONTRIBUTED TALKS

M. Shrestha, “Polarized bow shocks reveal features of the winds and environments of massive stars”, *231st Meeting of the AAS*, Washington DC, January 2018

M. Shrestha, “Polarization Behavior of Stellar Wind Bow Shocks”, *Annual Meeting of the APS Four Corners Section*, Colorado State University, CO, October 2017

M. Shrestha, “Understanding the Relation of Progenitors and Supernovae Through the Study of Circumstellar Materials”, *Annual Meeting of the APS Four Corners Section*, University of Denver, CO, October 2013

M. Shrestha, and M. M. Beaky, “Identifying Delta Scuti Variable in Eclipsing Binaries.”, *Student Research Conference*, Truman State University, MO, April 2012

M. Shrestha, and M. Goggin, “Down Conversion in Biaxial Crystal”, *Student Research Conference*, Truman State University, MO, April 2012

M. Shrestha, and M. M. Goggin, “Down Conversion in Biaxial Crystal”, *National Conference of Undergraduate Research (NCUR)*, Weber State University, UT, March 2012

M. Shrestha, and M. M. Beaky, “Identifying Delta Scuti Variable in Eclipsing Binaries.”, *TruSymposium*, Truman State University, MO, August 2011

POSTERS PRESENTATIONS

A.A. Lin, **M. Shrestha**, T. Wolfe, R.E. Stencel, J.L. Hoffman, “Studying the Polarization of Astrophysical Bow Shocks”, *Annual Meeting of the APS Four Corners Section*, Colorado State University, CO, October 2017

M. Shrestha, J.L. Hoffman, H.R. Neilson, R. Ignace, “Study of polarization signature of bow shocks to constrain the properties of stellar wind”, *229th Meeting of the AAS*, Grapevine, TX, January 2017

M. Shrestha, J.L. Hoffman, H.R. Neilson, R. Ignace, “Polarization signatures of bow shocks in stellar wind”, *Physics of Evolved Stars*, Nice, France, June 2015

M. Shrestha, J.L. Hoffman, H.R. Neilson, R. Ignace, “Polarization of circumstellar bow shock due to electron scattering”, *Supercomputing 2014*, New Orleans, LA, November 2014

M. Shrestha, J.L. Hoffman, H.R. Neilson, R. Ignace, “Polarization of circumstellar bow shock due to electron scattering”, *Rocky Mountain HPC Symposium*, University of Colorado-Boulder, CO, November 2014, Honorable Mention

H. R. Neilson, R. Ignace, **M. Shrestha**, J.L. Hoffman, J. Mackey, “Modelling near-IR polarization to constrain stellar wind bow shocks”, *Massive Stars: From alpha to Omega*, Rhodes, Greece, June 2013

M. Shrestha, J.L. Hoffman, H.R. Neilson, R. Ignace, “Polarization of circumstellar bow shock due to electron scattering”, *223rd Meeting of the AAS*, Washington D.C., , January 2013

SUMMER SCHOOL

San Diego Supercomputer Center Summer Institute, San Diego, USA, July 31 - August 4, 2017

- Selected for the summer institute and awarded room and board scholarship

Monte Carlo Summer School, Saint Andrews, Scotland, August 23-28, 2015

SERVICE

University of Denver

Denver, CO

- Operated solar telescope, taught middle school students to use Galileoscope, and explained physics behind telescopes at Observatory Park. 2017
- Did physics related demonstrations in STEMosphere event 2015
- Operated sun spotter and educated 6th grade girls about the way lenses work 2014
- Operated sun spotter and Galileoscope at Diversity Summit’s 2nd annual day of action 2014
- Science Fair Judge 2013

Merrill Middle School

Denver, CO

- Science Fair Judge 2013

Public Library

Kirksville, MO

- Educated primary school students about density of material 2012

TECHNICAL SKILLS

Programming Experience

- Monte Carlo Radiative Transfer method
- Programming Languages: Fortran 90, Python, IDL, Mathematica, Gnuplot, Latex, Bash, HTML, JavaScript

Observational and Data Reduction Experience

- Observed polarization of stars using DUSTPol (Denver University Small Telescope polarimeter) for 5 nights
- Operated 14 inch telescope at the Truman Observatory for a whole summer of 2011
- Collected data of delta Scuti eclipsing binaries candidates using remote Tzec Maun telescopes
- Analyzed the observational data of delta Scuti eclipsing binaries using MaximDL
- Analyzed the light curves of delta Scuti eclipsing binaries

LANGUAGES

- Nepali (Native)
- Fluent in English (speaking, reading, writing)
- Intermediate in Hindi (speaking, reading); basic(writing)