BEENA MEENA

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RESEARCH INTERESTS AND EXPERTISE

Galaxy formation & evolution, Active Galactic Nuclei (AGN), Star-formation, Stellar population, AGN & Stellar feedback, Gas kinematics, Galaxy mass and rotation, James Webb Space telescope (JWST) data reduction and calibration, Hubble Space Telescope (HST) spectroscopy and photometry, Ground-based observations, Emission- & absorption-line diagnostics

EDUCATION

Ph.D. in Physics (Concentration in Astrophysics) 2022
Georgia State University

M.S. in Physics 2018
Georgia State University

M.Tech. in Opto-electronics & Optical Communication Engineering 2013
Indian Institute of Technology, Delhi

B.Tech. in Electronics & Communication Engineering 2010
Govt. Engineering College, Ajmer

EMPLOYMENTS

Postdoctoral Researcher Sept 2022 - Present
Space Telescope Science Institute

Graduate Teaching/Research Assistant Aug 2015 - Jul 2021
Georgia State University

Intellectual Property Researcher Jan 2014 - Aug 2015
CPA Global, India

Assistant Professor Jun 2013 - Dec 2013
JECRC University, Jaipur

Graduate Teaching Assistant Jul 2011 - May 2013
Indian Institute of Technology, Delhi

AWARDS & SCHOLARSHIPS

Provost's Dissertation Fellowship 2021
Georgia State University, USA

First place Georgia State University Three Minute Thesis (3MT) Competition 2020
Georgia State University, USA

International Astronomical Union (IAU) Symposium - 359 Travel Grant 2020
Bento Gonçalves, Brazil

Atlanta Science Communication Fellowship 2019
Atlanta Science Festival, Atlanta, GA

Graduate Aptitude Test in Engineering (GATE) Scholarship 2011
Ministry of Human Resource Development (MHRD), India

Gargi Award 2005
Balika Shiksha Foundation, Govt. of Rajasthan, India

ACCEPTED PROPOSALS

A UV IFU in Space: Observations of AGN Feedback and Star Formation in NGC 1068 Co-I
Hubble Space Telescope - Cycle 32

SKY in 30D: Stellar Kinematic studY in 30 Doradus Co-I
James Webb Space Telescope - Cycle 3

Tracing the evolution of circumstellar and protoplanetary disks at low metallicity Co-I
James Webb Space Telescope - Cycle 3

Are Narrow Line Region Outflows an Effective Mode of AGN Feedback? Co-I
Hubble Space Telescope - Cycle 28

RESEARCH EXPERIENCE

Stellar Astronomy Sept 2022 - Present
Supervisors: Dr. Elena Sabbi and Dr. Peter Zeidler *Space Telescope Science Institute*

- Galaxy UV Legacy Project (GULP):
  - Data reduction, drizzling and photometry of multi-waveband (FUV to I-band) HST observations of 27 nearby galaxies
  - Investigating stellar population, ages and dust extinction
  - Color-Magnitude diagrams (CMD), Hertzsprung–Russell (HR) diagrams, stellar evolutionary tracks
  - Identifying large-scale stellar structures using machine-learning clustering algorithms
- JWST observations of NGC 602:
  - Reduction and calibration of Mid-Infrared Instrument (MIRI) imaging
  - Photometry using StarbugII
  - Identifying young stellar objects (YSOs) in NGC 602 and constraining their phsyical properties using SED fitting

AGN Astronomy Sept 2018 - Present
Advisor: Dr. D. Michael Crenshaw *Georgia State University*

- AGN feedback, mass distribution and kinematics of ionized gas in active galaxies.
- Space- and ground-based optical spectroscopic and imaging observations
- Spectroscopic data reduction and emission line diagnostics
- Two-dimensional modeling of surface brightness profiles in active galaxies

High Energy Particle Physics Sept 2016 - Aug 2018
Advisor: Dr. Xiaochun He *Georgia State University*

- Developing particle detector and measuring atmospheric temperature variations using cosmic rays

Master's Thesis Project: Plasmonics & Nano-photonics Jun 2012 - May 2013
Advisor: Dr. Anuj Dhawan *Indian Institute of Technology, Delhi*

- Designing palladium-coated plasmonic gas sensors using numerical simulations

OBSERVING AND ANALYSIS EXPERIENCE

James Webb Space Telescope Oct 2023 - Present

- Photometric data reduction and analysis of MIRI observations

Hubble Space Telescope Sept 2018 - Present

- Data reduction and analysis of Space Telescope Imaging Spectrograph (STIS) long slit spectra and Advanced Camera for Surveys (ACS)/Wide Field Camera 3 (WFC3) images

Astrophysical Research Consortium 3.5-meter Telescope Nov 2018 - Jun 2022
Apache Point Observatory, Sunspot, NM *Total: >250 hrs*

- Optical long slit spectroscopy with Dual Imaging Spectrograph (DIS)
- Optical imaging using Astrophysical Research Consortium Telescope Imaging Camera (ARCTIC)
- Planned and lead observations and data reduction of optical images and spectra

Hard Labor Creek Observatory, Rutledge, GA Feb 2019
Georgia State University

- Photometric monitoring of asteroids

TEACHING EXPERIENCE

Graduate Teaching Assistant Aug 2015 - May 2018
Georgia State University, Atlanta

- Volunteer instructor for Introductory Astronomy lab (solar system and basic telescopes) in Fall 2019.
- Instructor for Introductory Physics labs (Optics and Electromagnetism).
- Teaching assistant and substitute teacher (2 lectures) for Advanced Physics labs that involved teaching basic computer and software skills e.g., LINUX, Arduino, LABVIEW ROOT, and Python, to undergraduate students.

Assistant Professor Jun 2013 - Dec 2013
JECRC University, Jaipur

- Lecture: Engineering Physics
- Lecture: Electronics Devices and Circuits
- Laboratory: Engineering Physics

Graduate Teaching Assistant Aug 2011 - May 2013
Indian Institute of Technology, Delhi

- Substitute lecturer for 'Principles of Electrical Engineering'.
- Prepared lectures, tutorials and assignments.

LEADERSHIP & OUTREACH

Media/Writing

"Science of Track Cycling", Awesome Science of Everyday Life, Atlanta Science Festival

President Aug 2017 - Jul 2018
Women in Physics (WiP), Georgia State University

- Recruited WiP members and officers.
- Doubled the graduate student participation rate and tripled undergraduate participation.
- Organized monthly coffee hours with physicists and astronomers at GSU, GaTech and CERN.
- Planned and organized 'Women in STEM' conference in collaboration with other STEM organizations at GSU and with WiP chapters at Georgia Tech, Kenessaw State University and Agnes Scott College.

Charlie Elliott Astronomy Jun 2022

- Gave general public talk on supermassive black holes and black hole feedback

Graduate Student Ambassador Jan 2019 - July 2022
GOT Space (Georgia Outreach Team for Space)

- Space ATL Space Party at the Park: 'Phases of Moon' (Oct 2021)
- Wolf Creek Elementary School Virtual Presentation: 'Make a Comet on a Stick' (Feb 2021)

- Trip Elementary School STEM Night: demonstrated cool dry ice experiments (Jan 2020)
- Lanier High School Presentation on 'Galaxy Rotation' and 'Women in Physics at GSU' (Apr 2019)
- Maynard Holbrook Jackson High School Presentation on 'Galaxy in Radio' (Jan 2019)

Public viewing of Mercury Transit Nov 2019
Georgia State University, Downtown campus

- Helped set up the Coronado solar scopes and assisted public to observe transit of Mercury.

Hard Labor Creek Observatory Open House Mar 2019 – Jan 2020
Georgia State University

- Helped set up telescopes for public to view of several astronomical objects during the open house.

Total Solar Eclipse Viewing Party Aug 2017
Rabun Gap-Nacoochee School; partly organized by Georgia State University

- Lead the children's pinhole camera activity at the event.

Cloud Chamber Experiment Fall 2017, Spring 2018
Georgia State University

- Helped set up a semi-annual cloud chamber experiment at GSU for public and illustrated the cosmic particle interaction with matter.

Atlanta Science Festival Mar 2017
Georgia State University

- Hosted public demonstration of Geiger counter and explained the effects of radiation on health and talked about cosmic ray research at GSU.

INSTITUTION AND DEPARTMENTAL SERVICE

- Served on 'HotSci' selection and host committee at STScI/JHU, Summet 2023
- Served on the Department Colloquium Committee as the Astronomy student representative, Fall 2021-Spring 2022
- Served on the grad students committee and provided feedback on the extra-galactic faculty hiring, Fall 2019-Spring 2020

MENTORING

Pietro Facchini – Grad Student (Universität Heidelberg), STScI	Spring 2023
Julia Falcone – Grad Student, Georgia State University	Fall 2020-Present
Garrett Polak – Undergraduate Student, Georgia State University	Summer 2019-Dec. 2023
Sumantha Rotti (Astropal Mentee) – Grad Student, Georgia State University	Summer 2019-Spring 2020
Francisco Martinez – Undergraduate Student, Georgia State University	Fall 2018-Summer 2019
Rongsheng Li – Summer Intern, Georgia State University	Summer 2017

TECHNICAL SKILLS

Programming Language

- Expert: Python, R, bash
- Intermediate Proficiency: IDL, Mathematica, html/css
- Limited Proficiency: C++, Matlab, SQL query

Software and Packages

- Astronomy: Astropy, IRAF/PyRAF, DS9, GALFIT, DiskFit, Cloudy, Drizzlepac, DOLPHOT, TOPCAT, Glue
- Others: LaTeX, MS Office, Git Repository

BIBLIOGRAPHY

Total citations:165, h-index: 6, i-10 index:6

Pending Publications

1. **Meena, B.** et al.,"Hierarchical Distribution and Evolution of Young Stellar Structures in NGC 4449", **Submitted to ApJ**
2. Sabbi, E., **Meena, B.**[1] et al.,"Galaxy UV Legacy Project: Survey Description and First Insights Into NGC 4449 Recent History of Star Formation", Currently in the second round of revisions after feedback from co-authors.
3. **Meena, B. et al.** "Identification & Characterization of young stellar objects in NGC 602 using JWST MIRI observations", In prep

Dissertation

1. **Meena, B. et al.**,"The Dynamics of Narrow Line Region Outflows in Nearby Active Galaxies", Dissertation, Georgia State University, 2022

Publications in Refereed Journals

8 publications: 2 first-author, 1 second author, 5 co-author; A list of selected publications can be found on ORCID, *Here*

1. **Meena, B.**; Crenshaw, D. M.; Schmitt, H. R.; Revalski, M.; Chapman, Z.; Fischer, T. C.; Kraemer, S. B.; Robinson, J. H., Falcone, J.; Polack, G. E., "Investigating the Narrow-line Region Dynamics in Nearby Active Galaxies", 2023 ApJ, 943, 98
2. **Meena, B.**; Crenshaw, D. M. ; Schmitt, H. R.; Revalski, M.; Fischer, T. C.; Polack, G. E.; Kraemer, S. B.; Dashtamirova, D., "Radiative Driving of the AGN Outflows in the Narrow-Line Seyfert 1 Galaxy NGC 4051", 2021 ApJ, 916, 31
3. Revalski, M.; **Meena, B.**[2]; Martinez, F.; Polack, G. E.; Crenshaw, D. M.; Kraemer, S. B.; Collins, N. R.; Fischer, T. C.; Schmitt, H. R.; Schmidt, J.; Maksym, W. P.; Rafelski, M., "Quantifying Feedback from Narrow Line Region Outflows in Nearby Active Galaxies – III. Results for the Seyfert 2 Galaxies Markarian 3, Markarian 78, and NGC 1068", 2021, ApJ, 910, 139
4. Falcone, J.; Crenshaw, D. M.; Fischer, T. C.; **Meena, B.**; Revalski, M.; Shea, M.; Riffel, R. A.; Chapman, Z.; Ferree, N.; Tutterow, J.; Davis, M., "An Analysis of Active Galactic Nucleus–driven Outflows in the Seyfert 1 Galaxy NGC 3227 ", 2024 ApJ, 971, 17
5. Polack, G. E.; R., M.; Crenshaw, D. M. ; Fischer, T. C. ; Schmitt, H. R. ; Kraemer, S. B. ; **Meena, B.**;; Rafelski, M., "Determining the Extents, Geometries, and Kinematics of Narrow-Line Region Outflows in Nearby Seyfert Galaxies ", 2024
6. Revalski, M.; Crenshaw, D. M. ; Rafelski, M; Kraemer, S. B; Polack, G. E.; Trindade Falcão, A.; Fischer, T. C.; **Meena, B.**; Martinez, F.; Schmitt, H. R.; Collins, N. R. ; Falcone, J., "Quantifying Feedback from Narrow Line Region Outflows in Nearby Active Galaxies. IV. The Effects of Different Density Estimates on the Ionized Gas Masses and Outflow Rates", 2022 ApJ, 930, 14
7. Robinson, J. H; Bentz, M. C; Courtois, H. M.; Johnson, M. C.; Crenshaw, D. M.; **Meena, B.**; Polack, G. E.; Silverstein, M. L.; Chen, D, "Tully-Fisher Distances and Dynamical Mass Constraints for 24 Host Galaxies of Reverberation-Mapped AGN", 2021, ApJ 912, 160
8. Gnilka, C. L.; Crenshaw, D. M.; Fischer, T. C.; Revalski, M.; **Meena, B.**; Martinez, F.; Polack, G. E.; Machuca, C.; Dashtamirova, D.; Kraemer, S. B.; Schmitt, H. R.; Riffel, R. A.; Storchi-Bergmann, T., "Gemini Near-Infrared Field

[1] As the second author, I performed the data reduction, calibration, and drizzling of HST photometric observations for the 27 galaxies in the GULP sample. I also conducted photometry on broadband FUV, NUV, and optical images, carried out color-magnitude diagram (CMD) analyses, and determined the density distribution of young massive stars in NGC 4449.

[2] As the second author, I performed the data reduction for the spectroscopic observations, conducted the kinematic analysis, and wrote the corresponding sections in the paper.

Spectrograph Observations of the Seyfert 2 Galaxy Mrk 3: Feeding and Feedback on Galactic and Nuclear Scales", 2020, ApJ, 893, 1

Publications in Refereed Proceedings

2 publications: 1 first-author, 1 co-author

1. **Meena, B.**; Crenshaw, D. M.; Fischer, T. C.; Schmitt, H. R.; Revalski; M., Polack, G. E., "Identifying the Extent of AGN Outfows using Spatially Resolved Gas Kinematics", Galaxy Evolution and Feedback Across Different Environments (GALFEED)-IAU Symposium, 2020, 359, 285
2. Crenshaw, D. M.; Gnilka, C. L.; Fischer, T. C.; Revalski, M.; **Meena, B.**; Martinez, F.; Polack, G. E.; Machuca, C.; Dashtamirova, D.; Kraemer, S. B.; Schmitt, H. R., "Observations of AGN Feeding and Feedback on Nuclear, Galactic, and Extragalactic Scales", 2021, Galaxy Evolution and Feedback Across Different Environments (GALFEED)-IAU Symposium, 2020, 359, 318

Invited Talks and Colloquium

1. "Investigating the Narrow-line Region Dynamics in Nearby Active Galaxies", Galaxies Journal Club, NASA Goddard, Aug 2024
2. "Investigating Properties of Young Massive Stars in Nearby Galaxies using High Resolution UV Survey with HST", STScI/JHU HotSci Colloquium, Jul 2024
3. "Large scale stellar structures and star-formation hierarchy in NGC 4449 using high resolution UV survey', IMF2024 workshop, Cosmic Threads: Interlinking the Stellar Initial Mass Function from Star-birth to Galaxies, Sexten, Italy, Mar 2024
4. "Radiative driving and its importance in radio-weak AGN", Lorentz Center Meeting: The importance of jet-induced feedback on galaxy scales, Leiden, The Netherlands, Oct 2023
5. "Tracing the Temporal Variations of Effective Temperature in Earth's Upper Atmosphere with Cosmic Ray Measurements", Inaugural International Workshop on Cosmic Ray Applications, Atlanta, GA, Oct 2019
6. "Statistical Modeling for Effective Temperature using Cosmic Ray data", Women in STEM conference, Georgia State University, Apr 2018
7. "Introduction to the Background Radiation and Applications", Atlanta Science Festival, Atlanta, GA, Mar 2017

Conference Talks

1. "UV Legacy Project: High Resolution HST Imaging of Star-Formation in Nearby Galaxies', Science with Hubble and James Webb Space Telescope VII, Porto, Portugal, Apr 2024
2. "The Origins and Driving Mechanism of Narrow Line Region Outflows", AGN Winds on the Chesapeak, Easton, MD, Jun 2023
3. "Galaxy UV Legacy Project (GULP): Hierarchical Properties of Star-Formation in Nearby Galaxies", Olympian Symposium 2023, Paralia Katerini, Greece, May 2023
4. "Probing the launching sites of AGN-driven outflows in nearby Seyfert galaxies", Young Astronomers on Galactic Nuclei meeting 2021
5. "Investigating the origins of AGN outflows using radiative driving models in nearby Seyfert galaxies", Talk Number 8, APO Symposium 2021
6. "AGN Outflows in the Narrow-Line Seyfert 1 Galaxy NGC 4051", Talk Number 426.01, 237th AAS Meeting 2021

7. "Study of Atmospheric Temperature Variations with Cosmic Ray (CR) Flux Measurements", 4th Annual Meeting of the APS Southeastern Section 2017, 62,12

Conference Posters

1. **Meena, B.**; Crenshaw, D. M.; Fischer, T. C.; Schmitt, H. R.; Revalski; M.; Polack, G. E., "Identifying the Extent of AGN Outflows using Spatially Resolved Gas Kinematics", Poster Number 304.17, International Astronomical Union (IAU) Symposium - 359, GALFEED 2020
2. **Meena, B.**; Crenshaw, D. M.; Fischer, T. C.; Schmitt, H. R.; Revalski, M.; Polack, G. E., "Measuring the Extents of AGN Outflows using Spatially Resolved Spectroscopy", Poster Number 304.17, 235th AAS Meeting 2020
3. **Meena, B.**; Crenshaw, D. M.; Revalski, M.; Gnilka, C. L.; Martinez, F.; Fischer, T. C., "Probing the Narrow Line Region Kinematics of the Seyfert 2 Galaxy Mrk 78 using Apache Point Observatory (APO) and Hubble Space Telescope (HST) Observations", Poster Number 242.12, 233rd AAS Meeting 2019

REFERENCES

(1) Dr. Elena Sabbi (Postdoctoral Supervisor)
Chief Scientist
International Gemini Observatory
NSF's National Optical-Infrared Astronomy Research Laboratory

(2) Dr. D. Michael Crenshaw (Thesis Advisor)
Distinguished University Professor
Department of Physics and Astronomy
Georgia State University
25 Park Place, Room 631
Atlanta, GA 30303
(404) 413-6036

(2) Dr. Bruce Elmegreen (Science Collaborator)
Katonah, NY 10536 USA

(2) Dr. Travis C. Fischer (Science collaborator and dissertation committee member)
ESA/AURA Astronomer II
Space Telescope Science Institute
3700 San Martin Drive
Baltimore, MD 21218, USA
410-338-2465