Dr. Ragadeepika Pucha

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Research Interests: Galaxy Formation and Evolution, Dwarf galaxies, Active Galactic Nuclei, Intermediate Mass Black Holes, Lyman-Alpha Emitters, Satellite galaxies, Resolved Stellar Populations, Stellar Halos

Positions

- **Postdoctoral Researcher** **2023 – Present**
  Department of Physics & Astronomy, University of Utah

Education

- **Ph.D in Astronomy and Astrophysics** **2016 – 2023**
  Steward Observatory, University of Arizona
  Advisors: Stéphanie Juneau, Arjun Dey
- **M.S in Astronomy and Astrophysics** **2016 – 2018**
  Steward Observatory, University of Arizona
  Advisors: Beth Willman, Jeffrey Carlin
- **Five Year Integrated M.Sc (Physics)** **2010 – 2015**
  Integrated Science Education and Research Center (ISERC)
  Visva-Bharati University, India

List of Publications

[17] **Pucha, R.**, Juneau, S., Dey, A., et al., Accepted for Publication, ApJ, *Tripling the Census of Dwarf AGN Candidates using DESI Early Data*.

[16] de los Reyes, M., Asali, Y., Wechsler, R., including **Pucha, R.**, et al., Submitted to ApJ, *Stellar Mass Calibrations for Local Low-Mass Galaxies*.

[15] Juneau, S., Canning, R., Alexandar, D., **Pucha, R.**, et al., Submitted to ApJ, *Identifying Quasars from the DESI Bright Galaxy Survey*.

[14] Siudek, **Pucha, R.**, M., Mezcua, M. et al., A&A, 691, 308, *Value Added Catalog of Physical Properties of more than 1.3 million galaxies from the DESI Survey*.

[13] DESI Collaboration, including **Pucha, R.**, et al., **2024**, AJ, 168, 2, *The Early Data Release of the Dark Energy Spectroscopic Instrument*.

[12] DESI Collaboration, including **Pucha, R.**, et al., **2024**, AJ, 167, 2, *Validation of the Scientific Program for the Dark Energy Spectroscopic Instrument*.

[11] Juneau, S., Jacques, A., Pothier, S., including **Pucha, R.**, et al., **2024**, arxiv:2401.05576, *SPARCL: SPectra Analysis and Retrievable Catalog Lab*.

[10] Fawcett, V., Alexander, D., Brodzeller, A, including **Pucha, R.**, et al., **2023**, MNRAS, 525, 4, *A Striking Relationship between Dust Extinction and Radio Detection in DESI QSOs: Evidence for a Dusty Blow-out Phase in Red QSOs*.

[9] DESI Collaboration, including **Pucha, R.**, et al., **2022**, AJ, 164, 209, *Overview of the Instrument for the Dark Energy Spectroscopic Instrument*.

[8] **Pucha, R.**, Reddy, N., Dey, A., et al., **2022**, AJ, 164, 159, *Lyα Escape from Low-mass, Compact, High-Redshift Galaxies*.

[7] Hviding, R., Hainline, K., Rieke, M., including **Pucha, R.**, et al., **2022**, AJ, 163, 223, *A New Infrared Criterion for Selecting Active Galactic Nuclei to Lower Luminosities*.

[6] Nidever, D., Dey, A., Fasbender, K., including **Pucha, R.**, et al., **2021**, AJ, 161, 192, *Second Data Release of the All-sky NOIRLab Source Catalog*.

[5] Pat, F., Juneau, S., Böhm, V., **Pucha, R.**, et al., **2020**, ASP Conference Series, Vol. 525, p67, *Reconstucting and Classifying SDSS DR16 Galaxy Spectra with Machine-Learning and Dimensionality Reduction Algoriths*.

[4] Carlin, J., Garling, C., Peter, A., including **Pucha, R.**, et al., **2019**, ApJ, 886, 109, *Tidal Destruction in a Low-mass Galaxy Environment: The Discovery of Tidal tails around DDO 44*.

[3] **Pucha, R.**, Carlin, J., Willman, B., et al., **2019**, ApJ, 880, 104, *Hyper Wide Field Imaging of the Local Group Dwarf Irregular Galaxy IC 1613: An Extended Component of Metal Poor Stars*.

[2] Schindler, J., Fan, X., McGreer, I., including **Pucha, R.**, et al., **2018**, ApJ, 863, 144, *The Extremely Luminous Quasar Survey in the Sloan Digital Sky Survey Footprint. II. The North Galactic Cap Sample*.

[1] **Pucha, R.**, Hiremath, K.M., Gurumath, S., **2016**, Journal of Astrophysics and Astronomy, 37, 3, *Development of a Code to Analyze the Solar White-Light Images from the Kodaikanal Observatory: Detection of Sunspots, Computation of Heliographic Coordinates and Area*.

Data Tutorial Jupyter Notebooks

2020 – Present: Science Use Case Developer, Astro Data Lab, NOIRLab (Formerly NOAO)

- Comparison of Spectroscopy from Sloan Digital Sky Survey (SDSS) and Dark Energy Spectroscopic Instrument (DESI) Survey.
- Introduction to Dark Energy Spectroscopic Instrument (DESI) Early Data Release (EDR).
- Multi-wavelength Image Cutouts and SDSS Spectra of Active Galaxies with Extreme Emission-Line Ratios.
- Stacking SDSS Spectra of Galaxies Selected from the BPT Emission-Line Diagnostic Diagram.

Advisees

- David Fowles, Undergraduate Student, University of Utah — **2024 – Present**
  Co-advisor with Prof. Yao-Yuan Mao
- Swagatha Bera, Undergraduate Student, Visva-Bharati University — **2020 – Present**

Selected Talks and Posters

Invited Talks

- **2024:** DESI December Collaboration Meeting, Plenary Talk, *Tripling the Census of Dwarf AGN Candidates Using Early DESI Data*.
- **2022:** CosmoPalooza, 239th AAS Meeting, *Active Black Holes in Dwarf Galaxies with DESI Survey Validation*.
- **2021:** Plenary Talk, DESI Collaboration Meeting, *Active Galactic Nuclei in Low-mass Galaxies using DESI Survey Validation*.
- **2021:** ISM* Series, Space Telescope Institute (STScI), *Escape of Lyα in Lyman-Alpha Emitters: Dependence on Galaxy Properties and Environment*.
- **2021:** Astro Data Lab Special Session, 237th AAS Meeting, *Joint Spectroscopic and Photometric Analysis of Low-Redshift Galaxies*.
- **2017:** Tata Institute of Fundamental Research Colloquium Series, TIFR, India, *Testing CDM on Small Scales: Search for Satellites Around Dwarf Galaxies*.

Contributed Talks

- **2023:** DESI December Collaboration Meeting, *Multi-Component Emission-Line Fitting in Low-Redshift DESI Targets*
- **2023:** Coordinating the Next Generation of Spectroscopic Processing and Analysis Tools, NOIRLab, *Emission-Line Fitting Using Astropy Modeling*
- **2022:** Steward Observatory Internal Symposium, University of Arizona, *AGN in Low-mass Galaxies: Early Results from DESI*.
- **2022:** What Drives the Growth of Black Holes? conference, *Black Hole Seeds in Dwarf Galaxies: Early Results from DESI*.
- **2022:** Origin, Growth, and Feedback of Black Holes in Dwarf Galaxies conference, *Co-evolution of Dwarf Galaxies and their Black Holes: Early Results from DESI*.
- **2022:** Large-Volume Spectroscopic Analysis of AGN and Star-Forming Galaxies in the Era of JWST

Workshop, Space Telescope Institute (STScI), Poster Lightning Talk, *Active Black Holes in Dwarf Galaxies using DESI*.
- **2021:** Data Tutorial, DESI Collaboration Meeting, *Introduction to DESI Everest Spectroscopic Data Release*.
- **2021:** Galaxy Crawl Series, Steward Observatory, University of Arizona, *Escape of Lyα in Lyman-Alpha Emitters: Dependence of Galaxy Properties and Environment*.
- **2021:** Early-Career Scientist Talk Series, Steward Observatory, University of Arizona, *Lyman-Alpha Emitters at $z \sim 2.65$: Probing the Low-mass Galaxies in the High-Redshift Universe*.
- **2020:** Non-KP Session Science Talk, DESI Collaboration Meeting, *Search for AGN in Low-mass Galaxies using DESI-BGS*.
- **2019:** Flash Talk, Small Galaxies, Cosmic Questions Conference, Durham University, Durham, UK, *Do Dwarf Galaxies Have Stellar Halos?: A Case Study in IC 1613*.
- **2018:** Steward Observatory Internal Symposium, University of Arizona, *Search for an Extended Component Around Local Group Dwarf Irregular Galaxy IC 1613*.
- **2015:** Sun Climate Seminar, Max Planck Institute for Solar System Research, Göttingen, Germany, *Extracting Meridional Flow Circulation from HMI Dopplergrams*.

Posters

- **2022:** Poster Symposium Targeting Early-career Researchers (PoSTER) Conference, *Lyman-Alpha Escape from Low-mass, Compact, High-Redshift Galaxies* (best poster award).
- **2022:** Poster Symposium Targeting Early-career Researchers (PoSTER) Conference, *Active Black Holes in Dwarf Galaxies from DESI*.
- **2021:** iPoster-plus, 237th AAS Meeting, *Lyman-Alpha Emitters at $z \sim 2.65$: Probing the Low-mass Galaxies in the High-Redshift Universe*.
- **2020:** DESI Collaboration Meeting, *Active Black Holes in Dwarf Galaxies using DESI*.
- **2018:** 231st AAS Meeting, *Wide-Field Structure of Local Group Dwarf Irregular Galaxy IC 1613*.

Scientific Collaborations

Dark Energy Spectroscopic Instrument (DESI)

- Galaxy & Quasar Physics AGN Topical Group Co-Lead — **2024 – Present**
- Member — **2019 – Present**

Grants and Proposals

- NASA ADAP Proposal, Science PI
  Co-evolution of Dwarf Galaxies and Black Holes — **2025 – 2027**
- Gemini Telescope Fast Turnaround Program 2024B, PI
  Discovery of the Lowest-Mass Black Hole in a Dwarf Galaxy — **September 2024**
- DESI Secondary Target Program, PI
  Intermediate-Mass Black Holes in Low-Mass Galaxies — **2021 – Present**

Awards and Honors

- **2022: FAMOUS grant**, American Astronomical Society.
- **2022: Best Poster Award**, Poster Symposium Targeting Early-career Researchers (PoSTER) Conference.
- **2021:** Honorable Mention, **Chambliss Astronomy Student Award**, 237th AAS Meeting.
- **2020: Jamieson Graduate Fellowship**, University of Arizona.
- **2016 – 2017: College of Science Fellowship**, University of Arizona.
- **2015: International Max Planck Research School (IMPRS) Fellowship**, Max Planck Institute for Solar System Research, Göttingen, Germany.
- **2012 – 2014:** Three consecutive years of **Innovation in Science Pursuit for Inspired Research** (INSPIRE) Summer Fellowship, Department of Science and Technology, India.
- **2010 – 2015: Innovation in Science Pursuit for Inspired Research** (INSPIRE) Fellowship for Undergraduate studies, Department of Science and Technology, India.

Technical Skills

- Programming: Python (primary), IDL, C, C++, SQL, GitHub, Slurm supercomputing.
- Softwares: ds9, GALFIT, GELATO, IRAF, Source Extractor, TOPCAT, LaTeX.
- Astronomy-related Python packages: astropy, astroconda, astrodrizzle, astroquery.

Observing Experience

- **April 2022:** Supporting Observer, Four half-night remote observations for the Dark Energy Spectroscopic Instrument (DESI) Survey.
- **February 2021:** Data Quality Scientist, Four nights remote observations for the Dark Energy Spectroscopic Instrument (DESI) Survey.
- **April 2017:** Three nights observations using the Vatican Advanced Technology Telescope, Mt.Graham, Arizona.
- **November 2016:** Two half-night observations with Hyper Suprime-Cam, Subaru Telescope, Mauna Kea, Hawaii.

Media Coverage

- **2025:** The University of Utah news, Treasure Trove of black holes in dwarf galaxies
- **2025:** Space, Largest-ever discovery of 'missing link' black holes revealed by dark energy camera
- **2024:** ScienceNews, *A Cosmic Census Triples the Known Number of Black Holes in Dwarf Galaxies* featuring our discovery of the largest sample of dwarf AGN candidates to date
- **2022:** The University of Arizona news, *Dark Energy Spectroscopic Instrument Creates Largest 3D map of the Cosmos*
  quoted regarding active galactic nuclei (AGN) in low-mass galaxies using DESI
- **2022:** Berkeley Lab News Center, *Dark Energy Spectroscopic Instrument (DESI) Creates Largest 3D Map of the Cosmos*
  quoted regarding active galactic nuclei (AGN) in low-mass galaxies using DESI

Selected Community Activities

- **2019 – Present:** *Project Bharati:* An initiative for developing scientific interest among high-school and undergraduate students in India.
- **2021:** *Dwarf Galaxies as Probes of the Universe*, ISERC I/O online talk series, Visva-Bharati University.
- **2020:** *Importance of Women Education in India*, online workshop, Girl Up Bombay.
- **2020:** *Women in STEM*, online talk series, Stem4Gils, New Delhi.
- **2020:** *Journey to the Planets, Stars, and Galaxies*, ISERC I/O online talk series, Visva-Bharati University.
- **2020:** *Stars, Planets, and Galaxies*, Astronomy during Lockdown, online talk series, India.
- **2019:** *Science as a Career*, presentation, CARE High School, Guntur, India.
- **2018:** *Women in Research - Towards a different path*, presentation, ASN Women's Engineering College, Guntur, India.
- **2017:** *Physics Outreach*, volunteer, Flandrau Planetarium, Tucson, AZ.
- **2014 – 2015:** *Astronomy Outreach Program*, volunteer, Indian Institute of Astrophysics.

Teaching and Mentoring

- **2023 – Present:** *Mentor* to graduate students, DESI Mentorship Program.
- **2019 – Present:** *Mentor* to >15 high-school and undergraduate students in India, Project Bharati.
- **2017 – 2022:** *Graduate Teaching Assistant*, University of Arizona
  - ASTR 202: Life in the Universe (Spring 2022)
  - ASTR 250: Fundamentals of Astrophysics (Fall 2020)
  - ASTR 203: Stars (Fall 2019, Fall 2021)
- **2018:** Volunteer, *Astronomy Tutoring for Major and Minors Program* (ATOMM), University of Arizona.
- **2013:** Teacher (Mathematics, Physics), *HOPE Foundation*, Kolkata, India.

References

- Dr. Yao-Yuan Mao, Assistant Professor, University of Utah, *yymao@astro.utah.edu*
- Dr. Stéphanie Juneau, Associate Astronomer, NSF's NOIRLab, *stephanie.juneau@noirlab.edu*
- Dr. Arjun Dey, Astronomer, NSF's NOIRLab, *arjun.dey@noirlab.edu*