Sumit K. Sarbadhicary – Curriculum Vitae

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RESEARCH INTERESTS

Supernovae, Supernova Remnants, Stellar Feedback, Stellar Evolution, Interstellar Medium, Stellar Populations, Nearby Galaxies

EMPLOYMENT

Sep 2021 – *CCAPP Postdoctoral Fellow*, Astronomy
The Ohio State University

2018-2021 *Postdoctoral Researcher*, Astronomy
Michigan State University
Supervisor: Laura Chomiuk

EDUCATION

2014-2018 PhD, Astronomy - University of Pittsburgh
Advisor: Carles Badenes (Pitt)
Thesis: *Progenitor Scenarios of Supernovae from Local Group Stellar Populations and Supernova Remnants*

2012-2014 M.S., Astronomy
University of Pittsburgh

2008-2012 B.S., Physics (Astronomy conc.)
Louisiana State University

PUBLICATIONS

9 first-authored papers: 7 submitted/published + 2 to-be-submitted in Nov (drafts linked)
18 co-authored papers: 11 with major(*) contribution (calculation, interpretation, writing).

LEAD-AUTHOR

1. **Sarbadhicary, S. K. et al 2023d**, to be submitted to ApJ
   [A first-look at Supernova Remnants in M33 with JWST]
2. **Sarbadhicary, S. K. et al 2023c**, to be submitted to MNRAS, [PDF link]
   [The End of Impostor Syndrome: JWST observations of SN 1997bs]

3. **Sarbadhicary, S. K. et al 2023b**, submitted to ApJ, arXiv:2310.17694
   [Where do stars explode in the ISM? – The distribution of dense gas around massive stars and supernova remnants in M33]
4. **Sarbadhicary, S. K. et al 2023a**, MNRAS, 526, 6214 **[1]**
   [On Odd Radio Circles as Supernova Remnants: Possible distances, ages and ambient environmentss]
5. **Sarbadhicary S.K. et al 2022**, ApJ, 928, 54 **[1]**
   [Testing the Momentum-driven Supernova Feedback Paradigm in M31]
6. **Sarbadhicary, S. K. et al 2021**, ApJ, 923, 31 **[16]**
   [CHILES VERDES: Radio variability at an unprecedented depth and cadence in the COSMOS field]
7. **Sarbadhicary S.K. et al 2020**, ApJ, 912, 120 **[3]**
   [The RR Lyrae Delay-Time Distribution: A Novel Perspective on Models of Old Stellar Populations]
8. **Sarbadhicary, S. K. et al 2019**, ApJ, 872, 191S **[9]**
   [The two most recent thermonuclear supernovae in the Local Group: Radio constraints on the progenitors and evolution]
9. **Sarbadhicary, S. K. et al 2017**, MNRAS, 464, 2326. **[44]**
   [Supernova Remnants in the Local Group I: A model for the radio luminosity function and visibility times of supernova remnants]

CO-AUTHORED

1. Hassani, H. et al (incl. **Sarbadhicary, S.**) 2023, submitted to ApJ
   The PHANGS-AstroSat Atlas of Nearby Star Forming Galaxies]
2. Pathak D. et al (incl. **Sarbadhicary, S. K.**) 2023, submitted to ApJ
   [A Two-component Probability Distribution Function Describes the mid-IR Emission from the Disks of Star-forming Galaxies]
3. Peltonen J. et al (incl. **Sarbadhicary, S. K.**) 2023, submitted to MNRAS
   [JWST Reveals Star Formation Across a Spiral Arm in M33]
4. Egorov O. V. et al (incl. **Sarbadhicary, S. K.**) 2023, A&A, 678, 153 **[2]**
   [Quantifying the energy balance between the turbulent ionised gas and young stars]
5. *Hosseinzadeh G., Sand D., **Sarbadhicary, S. K.** et al 2023, ApJL, 953, 15 **[4]**
   [The Early Light Curve of SN 2023bee: Constraining Type Ia Supernova Progenitors the Apian Way]
6. Watkins E. J. et al (incl. **Sarbadhicary, S. K.**) 2023, A&A, 676, 67 **[4]**
   [Quantifying the energetics of molecular superbubbles in PHANGS galaxies]
7. Chen N. M. et al (incl. **Sarbadhicary, S. K.**) 2023, ApJL, 944, 28 **[2]**
   [Serendipitous Nebular-phase JWST Imaging of SN Ia SN 2021aefx: Testing the Confinement of ^{56}Co Decay Energy]
8. *Barnes, A. T. et al (incl. **Sarbadhicary, S. K.**) 2022, ApJL, 944, 22 **[13]**
   [PHANGS-JWST First Results: Multi-wavelength view of feedback-driven bubbles (The Phantom Voids) across NGC 628]
9. *Nyamai, M. M. et al (incl. **Sarbadhicary, S. K.**) 2022, MNRAS, 523, 1661 **[3]**
   [Synchrotron emission from double-peaked radio light curves of the symbiotic recurrent nova V3890 Sagitarii]
10. *Chen, N. M. et al (incl. **Sarbadhicary, S. K.**) 2023, ApJ, 944, 110 **[4]**
    [Comparing the locations of supernovae to CO (2-1) emission in their host galaxies]
11. *Harris, C. E., **Sarbadhicary, S. K.** et al 2022, accepted to ApJ, arXiv:2305.15481
    [Radio Observations of Six Young Type Ia Supernovae]
12. *Dong, Y., Milisavljevic, D., Leja, J., **Sarbadhicary, S. K.** et al 2022, 927, 199 **[6]**
    [Physical Properties of the Host galaxies of Ca-rich Transients]
13. *Sand, D., **Sarbadhicary, S. K.** et al 2021, ApJ, 922, 21 **[13]**
    [Circumstellar Medium Constraints on the Environment of Two Nearby Type Ia Supernovae: SN 2017cbv and SN 2020nlb]

14. *Burke J., Howell D. A., **Sarbadhicary S. K.** et al 2021, ApJ, 919, 142 **[23]**
[A Bright Ultraviolet Excess in the Transitional 02es-like Type Ia Supernova 2019yvq]
15. Nyland, K. et al (incl. **Sarbadhicary, S.K.** 2020, ApJ, 905, 74 **[50]**
[Quasars that have Transitioned from Radio-quiet to Radio-loud on Decadal Timescales Revealed by VLASS and FIRST]
16. *Pellegrino, C., Howell, D. A., **Sarbadhicary, S. K.** et al 2020, ApJ, 897, 159 **[18]**
[Constraining the Source of the High-velocity Ejecta in Type Ia SN 2019ein]
17. *Cendes, Yvette, Drout, Maria R., Chomiuk, Laura, **Sarbadhicary, S. K.** 2020, ApJ, 894, 39 **[10]**
[Thirty Years of Radio Observations of Type Ia SN 1972E and SN 1895B: Constraints on Circumstellar Shells]
18. *Launey, K. D., **Sarbadhicary, S. K.** et al 2014, Comp. Physics Communications, 185, 284 **[8]**
[Program in C for studying characteristic properties of two-body interactions in the framework of spectral distribution theory]

SUCCESSFUL GRANTS/PROPOSALS

PRINCIPAL INVESTIGATOR

- **Hubble:** AR 17572 (Archival, 1-2 yrs)
[A comprehensive survey of where stars explode in the interstellar medium]
- **e-MERLIN:** CY15208 (48 hrs)
[e-MERLIN observations of the first JWST-detected supernova remnants in M33]
- **VLA:** 23A-382 (1 hr)
[VLA observation of the very young nearby Type Ia 2023bee]
- **VLA:** 23A-328 (9.25 hrs)
[A comprehensive search for late-time radio emission from Type Ia-CSM]
- **VLA:** 19B-346 (1 hr)
[The first radio observation of a Type Ia SN with an optical bump - SN 2019yvq]
- **VLA:** 20B-355, 21B-295 (12 hrs total, Triggered)
[Young Type Ia supernovae in radio – a novel probe of progenitor scenarios]
- **VLA:** 20A-577 (1 hr)
[VLA observation of the very young sub-luminous Type Ia SN 2020nlb]

CO-INVESTIGATOR

- **JWST:** GO 3707 (149 hrs, PI: A. Leroy)
[A JWST Census of the Local Galaxy Population: Anchoring the Physics of the Matter Cycle]
- **JWST:** GO 4256 (10.35 hrs, PI: A. Leroy)
[Dust imaging of low metallicity molecular clouds in NGC 6822 and WLM]
- **JWST:** GO 2987 (22.06 hrs, PI: A. Leroy)
[Resolving HII Regions and ISM Structure Across the Milky Way Analog NGC 253]
- **Hubble:** GO 17502 (169 orbits, PI: D. Thilker)
[Resolving gas, star formation and feedback in nearby galaxies with an HST+JWST+ALMA Treasury]
- **ALMA**: 2022A-S023, 2023.1.00686.S (PI: E. Koch)
[Linking Molecular Cloud Structure to Massive Star Formation: 5000 molecular clouds, filaments, and bubbles across M33]
- **Chandra:** 22700460 Cycle 22 (84 ks, PI: K. Nyland)
[Pilot study of Radio-changing-state Quasars identified in the VLASS survey]
- **VLA:** 20A-346 (1800 hrs, PI: A Leroy)
[A VLA Local Group Legacy Survey - X-Proposal]

- **VLA:** 20B-329 (8.58 hrs, PI: K Nyland)
  [The Radio SED Evolution of Compact and Variable Radio AGN Identified in VLASS]
- **VLA:** 18A-467, 19A-110 (31.5 hrs total, PI: J. Maldonado)
  [The Search for Radio Supernova Remnants in M31]
- **SMA**: 2022A-S023 (PI: E. Koch)
  [Resolving the molecular gas fuelling IC 10's starburst on 2.5 pc scales]
- **VLBA:** 20A-201 (48 hrs, PI: Nyland K.)
  [Follow-up of VLASS AGN Transients at High redshift]
- **GMRT:** 38_040 (28 hrs, PI: Nyland K.)
  [Radio SED Modeling of Compact AGN with Extreme Radio Variability]

MENTORSHIP

GRADUATE STUDENTS

- **Jing Li (PhD-):** IMPRS HD, U. Heidelberg, w/ Dr. Kathryn Kreckel
  [Thesis: Supernova Remnants and Feedback in PHANGS-MUSE survey]
- **Ness Mayker Chen (PhD-):** Ohio State University w/ Dr. Adam Leroy
  [Thesis: Supernova environments in the PHANGS survey]
- **Katie Bowen (MS, 2023):** Michigan State University w/ Dr. Laura Chomiuk
  [Thesis: Radio-continuum observations of IC 1613]

UNDERGRADUATE STUDENTS

- **Grace Showerman (BS-):** Michigan State University
  [Radio observations of old Type Ia Supernovae]
- **Matthew Bartnick (BS, 2023):** Michigan State University (now PhD student at West Virginia University)
  [Radio observations of old Type Ia Supernovae]
- **Jordan Wagner (BS, 2023):** Ohio State University (now working in private sector)
  [Where do massive stars explode in the ISM?]
- **Yuxin Dong (BS, 2021):** Purdue University w/ Dr. Dan Milisavljevic (now PhD student at Northwestern University)
  [Physical Properties of the Host galaxies of Ca-rich Transients]
- **Jasmin Washington (BS,2020):** U Virginia (now PhD student in U. Arizona)
  [AAS 235: Constraining Type Ia Supernova Progenitor Environments with Late-Time Radio Observations – 307.11]
- **Hazirah Sanani (BS,2020):** Michigan State University
  [A Case Study of Nova Progenitors in the Andromeda Galaxy]
- **Mairead Heger (BS,2018):**, U. Pittsburgh (now PhD student at U. Toronto)
  [Delay-time distribution of variable stars]

ACADEMIC AWARDS

- 2019 AAS International Travel Grant
- 2019 NASA Travel Fund for *The Deaths and Afterlives of Massive Stars*
- 2017 Andrew Mellon Pre-doctoral Fellowship
- 2016 Thomas-Lain Scholarship
- 2014 Best Speaker Award (shared w. Amanda Yoho out of 48 speakers), Neighborhood Workshop in Astrophysics and Cosmology, Pennsylvania State University
- 2008-12 LSU Golden Oak Scholarship

TEACHING

- **Guest lecturer:** Topics in Astrophysics, 2022 (Instructor: Ji Wang)
- **Guest lecturer:** Galactic & Extra-galactic Astronomy, 2016 (Instructor: C. Badenes).
- **Teaching Assistant:** Stars, Galaxies and Cosmos, Fall 2013 (Instructor: M. Wood-Vasey)
- **Teaching Assistant:** Stars, Galaxies and Cosmos, Summer 2013 (Instructor: D. Turnshek)
- **Teaching Assistant:** Basics of Space Flight, Spring 2013 (Instructor: R. S. Ladbeck)
- **Teaching Assistant:** Basic Physics for Science and Engineering I, 2012 (Instructor: B. D'urso)
- **Grader:** Physics and Society, 2012 (Instructor: E. Gerjuoy)

OUTREACH AND DEI

- **Committee Member:** OSU Astronomy Committee on Diversity, Equity, and Inclusion (2023-)
- **Presenter:** *Friends of Ohio State Astronomy & Astrophysics* (2022)
- **Mentor:** NRAO NAC Program for under-represented STEM students (2019)
- **Presenter:** *Astronomy on Tap*, Lansing [Video link] (2018-21)
- **Presenter:** *Investing Now*, U. Pittsburgh (2017)
  [Science demonstrations as part of a college-preparatory program for pre-college students from historically under-represented groups in STEM]
- **Telescope Operator/Presenter:** White House Frontiers Conference Astronomy Night, Alleghany Observatory (2016)
- **Organizer:** *Astrosnacks* Career Development Seminars, U. Pittsburgh (2015-18)
- **Presenter:** Landolt Astronomical Observatory, Louisiana State University (2012)
- **Presenter:** Louisiana Junior Science and Humanities Symposium (for high-school students), Baton Rouge, LA (2011)

RESEARCH PRESENTATIONS

INVITED TALKS

- U. Melbourne (Australia), 2023: *Astro Group Meeting*
- Gemini/Cerro Tololo Inter-American Observatory, 2021: *Science Coffee*
- AAS Journal Series, 2021 [Video]
- Ohio State University, 2021: *CCAPP Tuesday Seminar*
- Michigan State University, 2019: *Astronomy & Astrophysics Seminars*
- Ohio State University, 2017: *CCAPP Astroparticle Lunch*
- UC Santa Cruz, 2017: *Supernova Remnants Workshop*
- U Pittsburgh, 2016: *Astrolunch seminars*
- Carnegie Mellon University, 2015: *Astrostatistics seminar*

CONTRIBUTED TALKS

- RACV Healsville (Australia), 2023: *New Views on Feedback & the Baryon Cycle in Galaxies*
- AAS 242, 2023 [Abstract]
- U Illinois Urbana-Champaign, 2023: *The Transient and Variable Universe* [Video]
- Vancouver (Canada) 2023: *New Eyes on the Universe: SKA and ngVLA* [Video]
- Caltech 2023: *Scientific Frontiers and Synergies for the DSA-2000 Radio Camera* [Video, starts at 1:41:42]

- KITP Santa Barbara, 2022: *White Dwarfs from Physics to Astrophysics* [Video]
- CfA Harvard, 2022: *Supernova Remnants and their Progenitors* [Video]
- Ohio State University, 2022: *CCAPP Fellows Symposium*
- SKA Observatory, 2021: *Virtual Conference: A Precursor View of the SKA Sky*
- U. Chicago, 2019: *Midwest Workshop on Supernova & Transients* [Abstract/slides]
- STSCI, 2019: *The Deaths and Afterlives of Stars* [Video]
- Chania (Greece) 2016: *Supernova Remnants: An Odyssey in Space after Stellar Death II* [Recording and Slides]
- AAS 231, 2018: Dissertation Talk [Abstract]
- U. Chicago, 2017: *Astro Tuesday Series seminars*
- U. Michigan, 2017: *Extreme Astrophysics seminars*
- NOAO, 2017: *Friday Scientific Lunch Talks*
- U. Washington, 2017: *Astronomy Seminar*
- Oregon State University, 2017: *FOE17 (Fifty-One-Erg)*
- Chania (Greece), 2016: *Supernova Remnants: An Odyssey in Space after Stellar Death I* [Recording and Slides]
- Penn State University, 2014: *Neighborhood Workshop in Astrophysics and Cosmology II*

POSTERS

- Chalmers University (Sweden) 2022: *From Stars to Galaxies II Connecting our understanding of star and galaxy formation*
- Flatiron Institute, 2022: *Computational Astrophysics in the ngVLA Era: Synergistic Simulations, Theory, and Observations*
- NRAO Socorro, 2017: *Developing the ngVLA Science Program Workshop*
- U. Michigan, 2015: *Local Group Astrostatistics*

ACADEMIC SERVICE

- **Organizer:** 2022 CCAPP Fellows Symposium, OSU (w. William Luszczak)
- **Founder & Organizer:** U. Pittsburgh-Carnegie Mellon University *Astrosnacks* seminars.
- **Representative:** 2016, 2018 Astrophysics Faculty Search Committee, University of Pittsburgh
- **Judge:** Chambliss Student Awards, AAS 231, Washington DC
- **Reviewer:** ApJ, MNRAS

SCIENCE COLLABORATIONS

- **PHANGS, (2022-)** – *Supernovae/Supernova remnants/Feedback*
- **SDSS-V** – *Local Volume Mapper*,Supernova Remnants, Feedback.
- **Local Group L-Band Survey, (2020-)** – *Radio-continuum science leader*
- **VLASS, (2019-20)** – *Scheduling, transients*
- **CHILES-VERDES (2019-21)** – *Radio variabilit lead.*
- **ThunderKAT (2020-)** – *Type Ia supernovae working group led by Assaf Horesh*

REFERENCES

- Dr. Carles Badenes (U. Pittsburgh)
- Dr. Laura Chomiuk (Michigan State University)
- Dr. Adam Leroy (Ohio State University)