

Nikko J. Cleri

Eberly Postdoctoral Fellow
The Pennsylvania State University

Summary

- » Research: Galaxy Evolution, High-Redshift Galaxies, Emission-Line Galaxies, Population III Stars, Active Galactic Nuclei, Black Hole Seeds, Star Formation, Dust Attenuation
- » Techniques: UV/Optical/Near-IR Spectroscopy, Photoionization Modeling
- » Collaborations: CEERS, NGDEEP, RUBIES, CAPERS
- » Awarded Proposals: >135k USD awarded as PI from *JWST* and *HST*, >500 total hours awarded on *JWST* and Gemini
- » Publications: 4 first author, 4 significant author, 50 coauthor, 2397 citations, h-index 24
- » Presentations: 16 research, 9 outreach and professional development

Academic and Professional Appointments

2024-	Eberly Postdoctoral Fellow	Penn State
2021-24	Graduate Student (Advisor: Prof. Casey Papovich)	Texas A&M
2019-21	Graduate Student (Advisor: Prof. Jonathan Trump)	UConn
2017-20	Research Assistant (Advisor: Prof. Gerald Dunne)	UConn
2018	NSF REU Student (Advisor: Prof. Louis Strigari)	Texas A&M

Education

Ph.D. Astronomy	Texas A&M University	2021 - 2024
» Advisor: Casey Papovich		
» Thesis: <i>Spectroscopic Studies of Stars and Black Holes Across Cosmic Time</i>		
M.S. Physics	University of Connecticut	2019 - 2021
» Advisor: Jonathan R. Trump		
» Thesis: <i>CLEAR: Paschen-β Star Formation Rates and Dust Attenuation in Low Redshift Galaxies</i>		
B.S. Physics Mathematics Minor	University of Connecticut	2015 - 2019
» Advisor: Gerald V. Dunne		
» Undergraduate Research: <i>Resurgent trans-series for generalized Hastings-McLeod solutions</i>		

Awarded Proposals and Grants

Summary
» Observatories: <i>JWST</i> , <i>HST</i> , Gemini
» Total Observing Time (PI + Co-I): 517.10 hours
» Total Money Awarded to Cleri: \$136k

Principal Investigator

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2024	JWST-AR-5558: <i>A Census of Optical Diagnostics of Ionizing Sources Across Cosmic Time</i>	
2021	HST-AR-16609: <i>Peering Through the Dust: Paschen-beta Indicators of Star Formation and Dust Attenuation</i>	~\$136k

Co-Investigator

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2024	JWST-GO-5718: <i>A Spectroscopic Census of Faint, Broad-Line AGN at $z>5$</i> (PI: D. Kocevski)	20.49 hours
2024	JWST-GO-5943: <i>What really are the Physical Properties of Galaxies in the Epoch of Reionization?</i> (PI: C. Papovich)	61.83 hours
2024	JWST-GO-5407: <i>MEOW: The MIRI Early Obscured-AGN Wide Survey</i> (PI: G. Leung)	73.95 hours
2024	JWST-GO-5507: <i>Deep Spectroscopy of Galaxies at $z=4-14$: Uncovering Drivers of Early Galaxy Formation and Black Hole Growth</i> (PI: T. Hutchison)	23.29 hours
2024	JWST-GO-6368: <i>The CANDELS-Area Prism Epoch of Reionization Survey (CAPERS)</i> (PI: M. Dickinson)	293.21 hours
2023	JWST-GO-3703: <i>Breaking the $z=10$ barrier with MIRI: redshift confirmation and detection of rest-frame optical emission lines</i> (PI: J. Zavala)	24.33 hours
2023	GS-2023A-Q-136: <i>Optical Spectroscopy of JWST ERO Galaxies</i> (PI: B. Backhaus)	20 hours

Honors and Awards

2022	Texas Space Grant Consortium Graduate Fellow - \$5K	Texas A&M
2018	NSF REU - \$5K	Texas A&M
2016	Dean's List - College of Liberal Arts and Sciences	UConn
2015-19	Governor's Scholarship - \$8.5K/yr	UConn
2015	Community Service Scholarship - \$1K	UConn

Teaching Experience

Teaching Assistant/Course Assistant

2019-21	PHYS 1501: Physics for Engineers I	UConn
2021	PHYS 1025: Introduction to Astronomy	UConn

Service

Physics & Astronomy Community

2024-	Referee - Astronomy & Astrophysics (A&A)
2021-	Referee - Astrophysical Journal (ApJ)

Department

2023-24	Graduate Representative - Astronomy	Texas A&M
2022-24	Organizer - Astronomy Journal Club	Texas A&M

Mentoring

2022-24	Coordinator - Mentoring and Advising Graduates in an Inclusive Community (MAGIC)	Texas A&M
2022-24	Mentor - Mentoring and Advising Graduates in an Inclusive Community (MAGIC)	Texas A&M
2017-18	Mentor - UConn Undergraduate Peer Mentoring	UConn

Outreach

2022	Volunteer - Gateway to Graduate School	Texas A&M
2022-24	Demonstrator - Physics and Engineering Festival	Texas A&M
2022	High School Research Reviewer - Lumiere	Texas A&M
2021-24	Presenter - Astronomy on Tap BCS 'In the News'	Texas A&M
2021-22	Treasurer - Astronomy on Tap BCS	Texas A&M
2021-22	Pen-Pal - Letters to a Pre-Scientist	Texas A&M
2018	Volunteer - Mitchell Institute Star Party Group	Texas A&M

Collaborations and Survey Membership

Co-I	CAPERS: The CANDELS-Area Prism Epoch of Reionization Survey	JWST
Member	RUBIES: (not an acronym)	JWST
Member	CEERS: The Cosmic Evolution Early Release Science Survey	JWST
Member	NGDEEP: The Next Generation Deep Exploratory Public Survey	JWST
Member	CLEAR: The CANDELS Ly α Emission at Reionization Survey	HST

Technical Skills and Programming Languages

Programming	Fluent: Python, LaTeX Familiar: SQL, Julia, C, C++, R, IDL, perl, Mathematica, MATLAB, HTML, CSS
Software	Fluent: Cloudy, PyNeb Familiar: grizli, DS9, IRAF, sbatch, slurm

Website Architect

- » Personal Website: njcleri.github.io
- » TAMU Astronomy (co-author): tamu-astro.github.io/
- » Mentoring and Advising Graduates in an Inclusive Community (MAGIC) (co-author): tx.ag/tamumagic

Publications

Lead/Co-Lead Author

4. **Cleri, N. J.**, Olivier, G. M., Hutchison T. A., et al. 2023, *Using [Ne V]/[Ne III] to Understand the Nature of Extreme-Ionization Galaxies*, ApJ, 953, 10
3. **Cleri, N. J.**, Yang, G., Papovich, C, et al. 2023, *CLEAR: High-Ionization [Ne V] λ 3426 Emission-line Galaxies at $1.4 < z < 2.3$* , ApJ, 948, 112
2. **Cleri, N. J.**, Trump, J. R., Backhaus, B. E., et al. 2022, *CLEAR: Paschen- β Star Formation Rates and Dust Attenuation of Low Redshift Galaxies*, ApJ, 929, 3
1. **Cleri, N. J.**, Dunne, G. V., 2020, *Resurgent trans-series for generalized Hastings-McLeod solutions*, Journal of Physics A: Mathematical General, 53, 355203

Significant Author

4. Larson, R.L., Finkelstein, S.L., Kocevski, D.D., Hutchison, T.A., Trump, J.R., Arrabal Haro, P., Bromm, V., **Cleri, N.J.**, et al. 2023, *A CEERS Discovery of an Accreting Supermassive Black Hole 570 Myr after the Big Bang: Identifying a Progenitor of Massive $z > 6$ Quasars*, ApJL, 953, L29
3. Backhaus, B.E., Bridge J.S., Trump, J.R., **Cleri, N.J.**, et al. 2023, *CLEAR: Detecting Low-Luminosity Active Galactic Nuclei at $0.6 < z < 1.3$ via Spatially Resolved Hubble Space Telescope Grism Emission Line Ratios*, ApJ, 943, 37
2. Prescott, M.K.M., Finlator, K.M., **Cleri, N.J.**, et al. 2022, *Using Multiple Emission Line Ratios to Constrain the Slope of the Dust Attenuation Law*, ApJ, 928, 71
1. Backhaus, B.E., Trump, J.R., **Cleri, N.J.**, et al. 2022, *CLEAR: Emission Line Ratios at Cosmic High Noon*, ApJ, 926, 161

Co-Author: Refereed

36. Hu, W., et al. 2024, *Characterizing the Average Interstellar Medium Conditions of Galaxies at $z \sim 5.6-9$ with UV and Optical Nebular Lines*, ApJ, 971, 21
35. Ronayne, K., et al. 2024, *CEERS: 7.7 μ m PAH Star Formation Rate Calibration with JWST MIRI*, ApJ, 970, 61
34. Wang, B., et al. 2024, *RUBIES: Evolved Stellar Populations with Extended Formation Histories at $z \sim 7 - 8$ in Candidate Massive Galaxies Identified with JWST/NIRSpec*, ApJL, 969, L13
33. Finkelstein, S.L., et al. 2024, *The Complete CEERS Early Universe Galaxy Sample: A Surprisingly Slow Evolution of the Space Density of Bright Galaxies at $z \sim 8.5 - 14.5$* , ApJL, 969, L2
32. Pirzkal, K., et al. 2024, *The Next Generation Deep Extragalactic Exploratory Public Near-Infrared Slitless Survey Epoch 1 (NGDEEP-NISS1): Extra-Galactic Star-formation and Active Galactic Nuclei at $0.5 < z < 3.6$* , ApJ, 969, 90
31. Jung, I., et al. 2024, *CEERS: Diversity of Lyman-Alpha Emitters during the Epoch of Reionization*, ApJ, 967, 73
30. Mascia, S. et al. 2024 *New insight on the nature of cosmic reionizers from the CEERS survey* A&A, 685, A3
29. Morales, A.M., et al. 2024, *Rest-Frame UV Colors for Faint Galaxies at $z \sim 9 - 16$ with the JWST NGDEEP Survey*, ApJL, 964, L24
28. Cheng, Y., et al. 2024, *Exploring the Gas-Phase Metallicity Gradients of Star-forming Galaxies at Cosmic Noon*, ApJ, 964, 94
27. Shen, L., et al. 2024, *NGDEEP Epoch 1: Spatially Resolved $H\alpha$ Observations of Disk and Bulge Growth in Star-Forming Galaxies at $z \sim 0.6-2.2$ from JWST NIRISS Slitless Spectroscopy*, ApJL, 963, L49

26. Barro, G., et al. 2023, *Extremely Red Galaxies at $z = 5-9$ with MIRI and NIRSpec: Dusty Galaxies or Obscured Active Galactic Nuclei?*, ApJ, 963, 128
25. Backhaus, B.E., et al. 2023, *CEERS Key Paper. VIII. Emission-line Ratios from NIRSpec and NIRCам Wide-Field Slitless Spectroscopy at $z > 2$* , ApJ, 962, 195
24. Kirkpatrick, A., et al. 2023, *CEERS Key Paper VII: JWST/MIRI Reveals a Faint Population of Galaxies at Cosmic Noon Unseen by Spitzer*, ApJL, 959, L7
23. Calabró, A, et al. 2023, *Near-infrared emission line diagnostics for AGN from the local Universe to redshift 3*, A&A, 679, A80
22. Fujimoto, S., et al. 2023, *ALMA FIR View of Ultra High-redshift Galaxy Candidates at $z \sim 11-17$: Blue Monsters or Low- z Red Interlopers?*, ApJ, 955, 130
21. Kocevski, D.D., et al. 2023, *Hidden Little Monsters: Spectroscopic Identification of Low-Mass, Broad-Line AGN at $z > 5$ with CEERS*, ApJL, 954, L4
20. Arrabal Haro, P., et al. 2023, *Spectroscopic confirmation of CEERS NIRCам-selected galaxies at $z \simeq 8-10$* , ApJL, 951, L22
19. Estrada-Carpenter, V., et al. 2023, *CLEAR: The Morphological Evolution of Galaxies in the Green Valley*, ApJ, 951, 115
18. Yang, G., et al. 2023, *CEERS Key Paper VI: JWST/MIRI Uncovers a Large Population of Obscured AGN at High Redshifts*, ApJL, 950, L5
17. Papovich, C., et al. 2023, *CEERS Key Paper IV: Galaxies at $4 < z < 9$ are Bluer than They Appear – Characterizing Galaxy Stellar Populations from Rest-Frame ~ 1 micron Imaging*, ApJL, 949, L18
16. Simons, R.C., et al. 2023, *CLEAR: Survey Overview, Data Analysis and Products*, ApJS, 266, 13
15. Constantin, L. et al. 2023, *Expectations of the size evolution of massive galaxies at $3 \leq z \leq 6$ from the TNG50 simulation: the CEERS/JWST view*, ApJ, 946, 71
14. Perez-Gonzalez, P.G., et al. 2022, *CEERS Key Paper V: A triality on the nature of HST-dark galaxies*, ApJL, 946, L16
13. Kocevski, D.D., et al. 2023, *CEERS Key Paper II: The Resolved Host Properties of AGN at $3 < z < 5$ with JWST*, ApJL, 946, L14
12. Finkelstein, S.L., et al. 2023, *CEERS Key Paper I: An Early Look into the First 500 Myr of Galaxy Formation with JWST*, ApJL, 946, L13
11. Guo, Y. et al. 2023, *First Look at $z > 1$ Bars in the Rest-Frame Near-Infrared with JWST Early CEERS Imaging*, ApJL, 945, L10
10. Trump, J.R. et al. 2023, *The Physical Conditions of Emission-Line Galaxies at Cosmic Dawn from JWST/NIRSpec Spectroscopy in the SMACS 0723 Early Release Observations*, ApJ, 945, 35
9. García-Argumánez, A. et al. 2023, *Probing the earliest phases in the formation of massive galaxies with simulated HST+JWST imaging data from Illustris*, ApJ, 944, 3
8. Zavala, J. et al. 2023, *Dusty starbursts masquerading as ultra high redshift galaxies in JWST observations*, ApJL, 943, L9
7. Rose, C. et al. 2023, *Identifying Galaxy Mergers in Simulated CEERS NIRCам Images using Random Forests*, ApJ, 942, 54
6. Finkelstein, S.L. et al. 2022, *A Long Time Ago in a Galaxy Far, Far Away: A Candidate $z \sim 14$ Galaxy in Early JWST CEERS Imaging*, ApJL, 940, L55
5. Papovich, C. et al. 2022, *CLEAR: The Ionization and Chemical-Enrichment Properties of Galaxies at $1.1 < z < 2.3$* , ApJ, 937, 22

4. Matharu, J. et al. 2022, *CLEAR: The Evolution of Spatially Resolved Star Formation in Galaxies between $0.5 \leq z \leq 1.7$ using $H\alpha$ Emission Line Maps*, ApJ, 937, 16
3. Jung, I. et al. 2022, *CLEAR: Boosted $Ly\alpha$ Transmission of the Intergalactic Medium in UV bright Galaxies*, ApJ, 933, 87
2. Simons, R. C. et al. 2021, *CLEAR: The Gas-Phase Metallicity Gradients of Star-Forming Galaxies at $0.6 < z < 2.6$* , ApJ, 923, 203
1. Estrada-Carpenter, V. et al. 2020, *CLEAR II: Evidence for Early Formation of the Most Compact Quiescent Galaxies at High Redshift*, ApJ, 880, 2

Co-Author: Submitted

14. Katz, H., et al. 2024, *21 Balmer Jump Street: The Nebular Continuum at High Redshift and Implications for the Bright Galaxy Problem, UV Continuum Slopes, and Early Stellar Populations*, arXiv e-prints, arXiv:2408.03189
13. Rose, C., et al. 2024, *CEERS Key Paper. IX. Identifying Galaxy Mergers in CEERS NIRCам Images Using Random Forests and Convolutional Neural Networks*, arXiv e-prints, arXiv:2407.21279
12. Seille, L.-M., et al. 2024, *Physical properties of strong $1 < z < 3$ Balmer and Paschen lines emitters observed with JWST*, arXiv e-prints, arXiv:2404.09659
11. de Graaff, A., et al. 2024, *Efficient formation of a massive quiescent galaxy at redshift 4.9*, arXiv e-prints, arXiv:2404.05683
10. Kocevski, D.D., et al. 2024, *The Rise of Faint, Red AGN at $z > 4$: A Sample of Little Red Dots in the JWST Extragalactic Legacy Fields*, arXiv e-prints, arXiv:2404.03576
9. Zavala, J., et al. 2024, *Detection of ionized hydrogen and oxygen from a very luminous and young galaxy 13.4 billion years ago*, arXiv e-prints, arXiv:2403.10491
8. Llerena, M., et al. 2024, *Physical properties of extreme emission-line galaxies at $z \sim 4 - 9$ from the JWST CEERS survey*, arXiv e-prints, arXiv:2403.05362
7. Wang, B., et al. 2024a, *RUBIES: JWST/NIRSpec Confirmation of an Infrared-luminous, Broad-line Little Red Dot with an Ionized Outflow*, arXiv e-prints, arXiv:2403.02304
6. Calabró, A., et al. 2024, *The evolution of the SFR and Σ_{SFR} of galaxies in cosmic morning ($4 < z < 10$)*, arXiv e-prints, arXiv:2402.17829
5. Napolitano, L., et al. 2024, *'Peering into cosmic reionization: the $Ly\alpha$ visibility evolution from galaxies at $z = 4.5-8.5$ with JWST*, arXiv e-prints, arXiv:2402.11220
4. Cole, J.W., et al. 2023, *CEERS: Increasing Scatter along the Star-Forming Main Sequence Indicates Early Galaxies Form in Bursts*, arXiv e-prints, arXiv:2312.10152
3. Davis, K., et al. 2023, *A Census from JWST of Extreme Emission Line Galaxies Spanning the Epoch of Reionization in CEERS*, arXiv e-prints, arXiv:2312.07799
2. Chworowsky, K., et al. 2023, *Evidence for a Shallow Evolution in the Volume Densities of Massive Galaxies at $z = 4$ to 8 from CEERS*, arXiv e-prints, arXiv:2311.14804
1. Jung, I, et al. 2022, *New $z > 7$ Lyman-alpha Emitters in EGS: Evidence of an Extended Ionized Structure at $z \sim 7.7$* , arXiv e-prints, arXiv:2212.09850

Presentations

Research Presentations

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| 16. | Talk: <i>High-Redshift Diagnostics of Ionizing Sources</i> , Madison, Wisconsin, USA | 17 July 2024 |
| 15. | Discussion Chair: <i>Active Galactic Nuclei and Little Red Dots</i> , San Lorenzo de El Escorial, Spain | 13 May 2024 |
| 14. | Talk: <i>Diagnostics of Ionizing Sources at High-z using Models and Observations</i> , San Lorenzo de El Escorial, Spain | 13 May 2024 |
| 13. | Talk: <i>Diagnostics of AGN, Black Hole Seeds, and Population III Stars with JWST</i> at the AAS 243rd Meeting, New Orleans, Louisiana, USA | 10 January 2024 |
| 12. | Poster: <i>Emission Line Ratio Diagnostics of AGN, Black Hole Seeds and Population III Stars with JWST</i> at the First Year of JWST Science Conference, Space Telescope Science Institute, Baltimore, Maryland, USA | 11 September 2023 |
| 11. | Talk: <i>Diagnostics of Exotic Ionizing Sources with JWST</i> at Texas A&M Astrosymposium, College Station, Texas, USA | 17 August 2023 |
| 10. | Talk: <i>Diagnostics of Exotic Ionizing Sources Across Cosmic Time - High-Ionization Emission-Line Ratios: Ne53</i> at University of Texas, Austin, Texas, USA | 10 May 2023 |
| 9. | Poster: <i>High-Ionization [Ne V] Emission-Line Galaxies at Cosmic Noon and the Epoch of Reionization</i> at AAS 241st Meeting, Seattle, Washington, USA | 12 January 2023 |
| 8. | Talk: <i>Using [Ne V] to Constrain the Sources of Highly-Energetic Photoionization Across Cosmic Time: Exploring the "Mystery of Neon" with HST and JWST</i> at Texas A&M University, College Station, Texas, USA | 2 December 2022 |
| 7. | Talk: <i>Extreme High-Ionization Emission-Line Galaxies at Cosmic Noon and the Epoch of Reionization: Exploring the "Mystery of Neon" with HST and JWST</i> at Texas A&M University, College Station, Texas, USA | 18 August 2022 |
| 6. | Talk: <i>The Evolution of Spectroscopy from HST to JWST: Implications for the Epoch of Reionization</i> at Texas A&M University, College Station, Texas, USA | 22 July 2022 |
| 5. | Poster: <i>HST Grism Observations of Paschen-Line Star-Formation and Dust Attenuation: A Precursor to the JWST Era</i> at AAS 240th Meeting, Pasadena, California, USA | 14 June 2022 |
| 4. | Talk: <i>Paschen-β Star Formation Rates and Dust Attenuation with HST and JWST</i> at Texas A&M Astrosymposium, College Station, Texas, USA | 27 August 2021 |
| 3. | Poster: <i>CLEAR: Paschen-β Star Formation Rates and Dust Attenuation in Low Redshift Galaxies</i> at AAS 237th Meeting, Virtual | 13 January 2021 |
| 2. | Poster: <i>Modeling ^8B Solar Neutrino Detection with $\text{CE}\nu\text{NS}$</i> at AAS 233rd Meeting, Seattle, Washington, USA | 9 January 2019 |
| 1. | Poster: <i>Modeling ^8B Solar Neutrino Detection with $\text{CE}\nu\text{NS}$</i> at TAMU Undergraduate Research Poster Session, College Station, Texas, USA | 1 August 2018 |

Outreach Presentations

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| 1. | Talk: <i>Beyond the Telescope: Unraveling Mysteries with AI in Astronomy</i> at Astronomy on Tap B/CS, Bryan, Texas, USA | 24 April 2024 |
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Professional Development Presentations

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| 8. | Panel: <i>GLASS Postdoc Panel</i> at Texas A&M University, College Station, Texas, USA | 8 March 2024 |
| 7. | Talk: <i>How to Be A Referee</i> at Texas A&M University, College Station, Texas, USA | 10 November 2023 |
| 6. | Panel: <i>How to Get Into Grad School</i> at Texas A&M University, College Station, Texas, USA | 28 July 2023 |
| 5. | Talk: <i>Data Visualization in Astronomy: More Important than the Science Itself?</i> at Texas A&M University, College Station, Texas, USA | 11 November 2022 |
| 4. | Panel: <i>How to Get Into Grad School</i> at Texas A&M University, College Station, Texas, USA | 29 July 2022 |
| 3. | <i>Data Visualization in Astronomy: More Important than the Science Itself?</i> at Texas A&M University, College Station, Texas, USA | 2 June 2022 |
| 2. | Workshop: <i>Matplotlib: The Champion of Plotting in Python</i> at Texas A&M University, College Station, Texas, USA | 2 June 2022 |
| 1. | Workshop: <i>pandas: Your Best Friend for Data Analysis in Python</i> at Texas A&M University, College Station, Texas, USA | 1 June 2022 |

References

Postdoctoral Advisor

Prof. Joel Leja

Penn State

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PhD Advisor

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M.S. Advisor

Prof. Jonathan R. Trump

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PhD Mentor

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