

Dr. Peter Senchyna

CONTACT INFORMATION	Carnegie Science Observatories 813 Santa Barbara Street Pasadena, CA 91101	psenchyna@carnegiescience.edu +1-626-304-0288 senchyna.space
RESEARCH INTERESTS	Massive stars, early galaxies, stellar evolution and feedback at low-metallicity, ionizing radiation, chemical enrichment, binary evolution	
APPOINTMENTS	Staff Scientist/Astronomer Carnegie Observatories, Pasadena, California	2024 – present
	Carnegie Fellow / NASA Hubble Fellow Carnegie Observatories, Pasadena, California	2020 – 2024
EDUCATION	University of Arizona , Tucson, Arizona Ph.D. Astronomy and Astrophysics <i>Thesis: Low-metallicity stars and high-redshift galaxies through the lens of local metal-poor star-forming regions</i>	June 2020
	University of Washington , Seattle, Washington B.S. Physics, Astronomy (Math) <i>Summa cum laude</i> , College Honors Research advisors: Julianne Dalcanton, Cliff Johnson	June 2015
HONORS, AWARDS, AND GRANTS	HST GO-17771 Grant HST GO-17526 Grant HST GO-17475 Grant Thacher Award (outstanding postdoctoral research, Carnegie) HST GO-17198 Grant HST GO-17129 Grant HST GO-16717 Grant NASA/Keck JPL Grant HST AR-16148 Grant Carnegie Postdoctoral Fellowship NASA/Keck JPL Grant NASA/Keck JPL Grant UA College of Science Fellowship Phi Beta Kappa, Sigma Pi Sigma (UW) UW Astronomy Undergraduate Prize in Research Mary Gates Achievement and Research Scholarships	2024 2024 2024 2023 2022 2022 2021 2021 2020 2020 2019 2017 2015 2014, 2015 2014 2012–2014
FIRST-AUTHOR PUBLICATIONS	Full list in ADS with metrics. <i>h</i> -Index: 17 [first-author papers only: <i>h</i> = 8]	

- [1] **P. Senchyna**, A. Plat, D. P. Stark, G. C. Rudie, D. Berg, S. Charlot, B. L. James, M. Mingozi. GN-z11 in context: possible signatures of globular cluster precursors at redshift 10. *ApJ* 966, id. 92, 15 pp. 2024.
- [2] **P. Senchyna**, D. P. Stark, S. Charlot, A. Plat, J. Chevallard, Z. Chen, T. Jones, R. Sanders, G. Rudie, T. J. Cooper, G. Bruzual. Direct constraints on the extremely metal-poor massive stars underlying nebular C IV emission from ultra-deep HST/COS ultraviolet spectroscopy. *ApJ* 930, id. 105, 28 pp. 2022.
- [3] **P. Senchyna**, D. P. Stark, S. Charlot, J. Chevallard, G. Bruzual, A. Vidal-García. Ultraviolet spectra of extreme nearby star-forming regions: Evidence for an overabundance of very massive stars. *MNRAS* 503, pp. 6112-6135, 2021.
- [4] **P. Senchyna**, D. P. Stark, J. Mirocha, A. E. Reines, T. Jones, J. S. Mulchaey. High-mass X-ray binaries in nearby metal-poor galaxies: on the contribution to nebular He II emission. *MNRAS* 494, pp. 941-957, 2020.
- [5] **P. Senchyna**, D. P. Stark, J. Chevallard, S. Charlot, T. Jones, A. Vidal-García. Extremely metal-poor galaxies with HST/COS: laboratories for models of low-metallicity massive stars and high-redshift galaxies. *MNRAS* 488, pp. 3492–3506, 2019.
- [6] **P. Senchyna**, D. P. Stark. Photometric identification and MMT spectroscopy of new extremely metal-poor galaxies: towards a better understanding of young stellar populations at low metallicity. *MNRAS* 484, pp. 1270–1284, 2019.
- [7] **P. Senchyna**, D. P. Stark, A. Vidal-García, J. Chevallard, S. Charlot, R. Mainali, T. Jones, A. Wofford, A. Feltre, J. Gutkin. Ultraviolet spectra of extreme nearby star-forming regions - approaching a local reference sample for JWST. *MNRAS* 472, pp. 2608–2632, 2017.
- [8] **P. Senchyna**, L. C. Johnson, J. J. Dalcanton, L. C. Beerman, M. Fouesneau, A. Dolphin, B. F. Williams, P. Rosenfield, S. S. Larsen. Panchromatic Hubble Andromeda Treasury. XIV. The Period-Age Relationship of Cepheid Variables in M31 Star Clusters. *ApJ* 813, 31, 8 pp. 2015.
- [9] H. Katz, A. P. Ji, O. G. Telford, **P. Senchyna**. Early Bright Galaxies from Helium Enhancements in High-Redshift Star Clusters. *OJA*, accepted, 2024
- [10] X. Xu et al. (+16 co-authors, including **P. Senchyna**). Shining a Light on the Connections between Galactic Outflows Seen in Absorption and Emission Lines. *ApJ* (under review), 2024
- [11] M. W. Topping, D. P. Stark, **P. Senchyna**, et al. Deep rest-UV JWST/NIRSpec spectroscopy of early galaxies: the demographics of CIV and N-emitters in the reionization era. *MNRAS* (under review), 2024

OTHER
REFEREED
PUBLICATIONS

- [12] Y. Chen et al. (24 co-authors, including **P. Senchyna**). Robust Nitrogen and Oxygen Abundances of Haro 3 from Optical and Infrared Emission. *ApJ* (under review), 2024
- [13] M. W. Topping, D. P. Stark, **P. Senchyna**, et al. Metal-poor star formation at $z > 6$ with JWST: new insight into hard radiation fields and nitrogen enrichment on 20 pc scales. *MNRAS* 529, pp. 3301-3322, 2024
- [14] M. Mingozi, B. L. James, D. Berg, et al. (+27 co-authors, including **P. Senchyna**). CLASSY VIII: Exploring the Source of Ionization with UV ISM diagnostics in local High- z Analogs. *ApJ* 962, id. 95, 28 pp. 2024
- [15] M. Tang, D. P. Stark, Z. Chen, C. Mason, M. Topping, R. Endsley, **P. Senchyna**, et al. JWST/NIRSpec spectroscopy of $z = 7-9$ star-forming galaxies with CEERS: new insight into bright Ly α emitters in ionized bubbles. *MNRAS* 526, pp. 1657-1686, 2023
- [16] W. Hu, C. Martin, M. Gronke et al. (+23 co-authors, including **P. Senchyna**). CLASSY VII Ly α Profiles: The Structure and Kinematics of Neutral Gas and Implications for LyC Escape in Reionization-era Analogs. *ApJ* 956, id. 39, 28 pp. 2023
- [17] E. Aydi et al. (24 co-authors, including **P. Senchyna**). Catching a nova X-ray/UV flash in the visible? Early spectroscopy of the very slow Nova Velorum 2022 (Gaia22alz). *MNRAS* 524, pp. 1946-1964, 2023
- [18] Y. Chen, T. Jones, R. Sanders, D. Fadda, J. Sutter, R. Minchin, E. Huntzinger, **P. Senchyna**, et al. Accurate oxygen abundance of interstellar gas in Mrk 71 from optical and infrared spectra. *Nature Astronomy*, 7, p. 771-778 2023
- [19] T. Y. Hsiao et al. (65 co-authors, including **P. Senchyna**). JWST reveals a possible $z \sim 11$ galaxy merger in triply-lensed MACS0647-JD. *ApJL*, 949, id. L34, 21 pp. 2023
- [20] M. Gull, D. R. Weisz, **P. Senchyna**, et al. A panchromatic study of massive stars in the extremely metal-poor local group dwarf galaxy Leo A. *ApJ* 941, id. 206, 35 pp. 2022
- [21] M. Mingozi, B. L. James, K. Z. Arellano-Córdova, D. A. Berg, **P. Senchyna**, J. Chisholm, J. Brinchmann, et al. CLASSY IV: Exploring UV diagnostics of the interstellar medium in local high- z analogs at the dawn of the JWST era. *ApJ* 939, id. 110, 39 pp. 2022
- [22] K. Z. Arellano-Córdova et al. (25 co-authors, including **P. Senchyna**). CLASSY V: The impact of aperture effects on the inferred nebular properties of local star-forming galaxies. *ApJ* 935, id. 74, 22 pp. 2022
- [23] B. L. James, and the CLASSY team (47 co-authors, including **P. Senchyna**). CLASSY II: A technical overview of the COS Legacy Archive Spectroscopic Survey. *ApJSS* 262, id. 37, 26 pp. 2022

- [24] D. A. Berg, and the CLASSY team (47 co-authors, including **P. Senchyna**). The COS Legacy Archive Spectroscopy Survey (CLASSY) Treasury Atlas. *ApJSS* 261, id. 31, 41 pp. 2022
- [25] S. Kulkarni, F. Harrison, B. W. Grefenstette, H. Earnshaw, and the UVEX team (49 coauthors, including **P. Senchyna**). *Science with the Ultraviolet Explorer (UVEX)*. Submitted to *PASP*, 68 pp. 2021
- [26] J. Chevallard, S. Charlot, **P. Senchyna**, D. P. Stark, A. Vidal-García, A. Feltre, J. Gutkin, T. Jones, R. Mainali, A. Wofford. Physical properties and H-ionizing-photon production rates of extreme nearby star-forming regions. *MNRAS* 479, pp. 3264–3273, 2018

ACTIVE LARGE
COLLABORATIONS

- Habitable Worlds Observatory (HWO) Science, Technology, Architecture Review Team (START)
 - Co-Chair of Stars & Stellar Populations sub-Working Group
 - Lead of Metal-Poor Massive Star Science Case Development
- COS Legacy Archive Spectroscopic Survey (CLASSY) HST treasury program
 - Massive Stars Working Group leader (with D. Stark, J. Chisholm, A. Plat)
- Ultraviolet Explorer (UVEX) — selected NASA MIDEX mission, in Phase B
 - Science team member, active in defining low-mass galaxies and Magellanic Clouds science cases and requirements

TALKS AND
CONFERENCES

- [1] **Invited speaker**, KITP Conference: August 2024
Cosmic Dawn Revealed by JWST
- [2] **Invited participant**, KITP Workshop: Aug.–Sept. 2024
Cosmic Origins: the First Billion Years.
- [3] **Invited key participant**, Lorentz Center Workshop: July 2024
Benchmarking stripped stars. Leiden, Netherlands
- [4] **Invited talk**, UV Science & Instrumentation Workshop, JPL. May 2024
- [5] **Astronomy Colloquium**, University of Hawaii IfA. April 2024
- [6] **Colloquium**, Carnegie Observatories. March 2024
- [7] **Physics & Astronomy Colloquium**, University of Iowa. February 2024
- [8] **Cosmology & Astronomy Seminar**, UC Davis. February 2024
- [9] **Astronomy Colloquium**, University of Michigan. February 2024
- [10] **Physics Colloquium**, University of Arkansas. January 2024
- [11] **Invited talk** on HabWorlds, NASA Cosmic Origins PAG Splinter Session at AAS #243, New Orleans. January 2024

- [12] **Talk**, ELT Science in Light of JWST. UCLA. December 2023
- [13] **Invited talk**, UT Austin Galaxies and Cosmology Seminar. Sept. 2023
- [14] **Invited talk**, NOIRLab FLASH seminar. September 2023
- [15] **Invited talk** and workshop leader, UV Galaxies & Beyond Astronomy. Reykjavik, Iceland. July 2023
- [16] **Invited talk**, Escape of Lyman radiation from galactic labyrinths. Kolymbari, Crete. April 2023
- [17] **Contributed talk** and CASSI student coordinator, AAS #241, Seattle. January 2023
- [18] **Invited talk**, UCSB Astronomy Seminar. November 2022
- [19] **Talk**, IAUGA Focus Meeting 4: UV Insights to Massive Stars and Young Stellar Clusters. August 2022
- [20] **Invited talk**, Galaxy Evolution Workshop. January 2022
- [21] **Talk**, SAZERAC: Early Galaxy Formation Near & Far. November 2021
- [22] **Talk**, IAU Virtual Workshop: Chemical Abundances in Gaseous Nebulae. May 2021
- [23] **Talk**, IAU Massive Stars Near & Far Virtual Meeting. May 2021
- [24] **Invited talk**, UT Austin Galaxies and Cosmology Seminar. March 2021
- [25] **Invited talk**, Harvard CfA Galaxies & Cosmology Seminar. March 2020
- [26] **Thesis talk**, AAS #235, Honolulu. January 2020
- [27] **Talk**, Lorentz Center Workshop: Revolutionary Spectroscopy of Today as a Springboard to Webb. October 2019
- [28] **Invited talk**, UC Davis Cosmology Seminar. October 2019
- [29] **Talk**, Carnegie Observatories Lunch Talk Seminar. September 2019
- [30] **Talk**, IAU Symposium 352: Uncovering Galaxy Evolution in the ALMA and JWST Era. June 2019
- [31] **Talk**, MMT 40th Anniversary Symposium. May 2019
- [32] **Talk/workshop**, Near-Far Connection Workshop: The Faint End of the High- z UV Luminosity Function. December 2018
- [33] **Talk**, Carnegie Observatories Lunch Talk Seminar. May 2018
- [34] **Talk**, Giant Magellan Telescope Community Science Meeting – Chemical Evolution of the Universe. September 2017
- [35] **Talk/workshop**, The Near-Far Galaxy Connection. December 2016
- [36] **Talk**, Aspen Winter Conference – The Reionization Epoch: New Insights and Future Prospects. March 2016

- **Hubble Space Telescope: 139 orbits +AR as PI**
 - Completing the picture of high-ionization UV emission powered by the most metal-poor massive star populations. **PI: P. Senchyna.** Cycle 32, 22 orbits, GO:17771
 - Mega-deep UV spectroscopy of star-forming galaxies: completing the picture of the extremely metal-poor massive stars underlying high-ionization UV nebular emission. **PI: P. Senchyna.** Cycle 31, 74 orbits, GO:17526
 - Probing the limits of nitrogenic ultraviolet emission in the most extreme nearby star-forming galaxies. **PI: P. Senchyna.** Cycle 31, 10 orbits, GO:17475
 - First look at the high-ionization UV nebular emission powered by the youngest stellar populations below 5% solar metallicity: the missing link to the reionization era? **PI: P. Senchyna.** Cycle 30, 7 orbits, GO:17198
 - UV spectroscopy of a serendipitously-detected He star in Leo A: an unprecedented glimpse of binary mass transfer at extremely low metallicity. **PI: P. Senchyna.** Cycle 29, 8 orbits, GO:16717
 - Painting the first empirical picture of massive stars below the metallicity of the SMC with ULLYSES. **PI: P. Senchyna.** Cycle 28, Archival proposal, AR:16148
 - Uncovering Extremely Metal-Poor Massive Stars in Leo A. **PI: P. Senchyna.** Cycle 27, 18 orbits, GO:15921
- **Other HST programs: 334 orbits as Co-I**
 - Pulling Back the Curtain Veiling Extreme UV Galaxies: Revealing the Mysterious Sources of He II Emission. PI: Kaelee Parker. Cycle 31, 25 orbits, GO:17430
 - Hot stars in the stellar evolution laboratory IZw18. PI: Göran Östlin. Cycle 30, 28 orbits, GO:17129
 - Massive Stellar Populations at Reionization Metallicities: Anchoring Stellar Population Models for the JWST Era. PI: Daniel Stark. Cycle 29, 54 orbits, GO:16677
 - Establishing the C/O gas-phase abundance scale: a critical need for galaxy evolution studies from $z = 0$ into the epoch of reionization. PI: Ryan Sanders. Cycle 29, 18 orbits, GO:16697
 - Ultra-Deep HST/COS Spectroscopy of Extremely Metal-Poor Galaxies. PI: Daniel Stark. Cycle 27, 10 orbits, GO:15881
 - The COS Legacy Archive Spectroscopic SurveY (CLASSY): A UV Treasury of Star-Forming Galaxies. PI: Danielle Berg. Cycle 27, 133 orbits, GO:15840
 - Massive Stellar Populations at Reionization-Era Metallicities with Ultra-Deep HST/COS Spectroscopy. PI: Daniel Stark. Cycle 26, 40 orbits, GO:15646
 - Extreme Wolf-Rayet Galaxies with HST/COS: Understanding CIII] Emission in the Reionization Era. PI: Daniel Stark. Cycle 25, 14 orbits, GO:15185
 - Extremely Metal Poor Galaxies with HST/COS: Completing the Groundwork for JWST. PI: Daniel Stark. Cycle 24, 12 orbits, GO:14679

- **JWST: 46 hours as Co-I**
 - Spectroscopy of Dwarf Galaxies in the Reionization Era: Ionizing Sources and Gas Conditions at Very Low Metallicity. PI: Daniel Stark. Cycle 1, 9.6 hours, GO:2478
 - Revealing the Ionizing Spectrum of Low-Metallicity Galaxies with MIRI. PI: Anne Jaskot. Cycle 1, 25.2 hours, GO:2424
 - Physical Properties of the Triply-Lensed $z = 11$ Galaxy. PI: Dan Coe. Cycle 1, 11.2 hours, GO:1433
- **NASA/Keck: 3 nights as PI**
 - Stellar feedback at extremely low metallicity with KCWI and HST/COS. **PI: Senchyna.** 2021B, 1 night.
 - Stellar feedback at extremely low metallicity with KCWI and HST/COS. **PI: Senchyna.** 2020A, 1 night.
 - Stellar Populations at Reionization-Era Metallicities. **PI: Senchyna.** 2017A, 1 night.
- **SOFIA: 17 hours as Co-I**
 - Accurate chemical abundance measurements: from $z = 0$ to the reionization epoch. PI: T. Jones. Cycles 7+8, 7.1+4.5 hours.
 - Far-IR lines in highly ionized dwarf starbursts: toward understanding high-redshift [C II] and [O III] emission. PI: B. Weiner. Cycle 7, 5 hours.
- ***Institutional TACs***
 - **LCO: Magellan Baade+Clay (2x6.5m OIR): 31+ nights as PI**
 - **MMT (6.5m OIR): 13.5 nights as PI**

STUDENT
MENTORSHIP

- Research co-advisor/mentor to Aarna Garg, UC Santa Cruz
Radio galaxies and HST spectroscopy June 2024–present
- Research advisor/mentor to Lauren Henson, Harvey Mudd College
HST spectroscopy of highly-ionized dwarf galaxies June 2023–present
- Mentor to Sofia Franck, UCSC 2023
- Completed [Advancing Inclusive Mentoring \(AIM\) Program](#) at Carnegie
Six-week hybrid discussion-based training program centering
on positive & inclusive mentoring practices 2023
- Research advisor and mentor to Bhavya Gupta, UCSD
SOFIA+optical observations of metal-poor galaxies 2022
- Mentor / research co-advisor to Anaelle Roc, Harvey Mudd College 2022
- Mentor to Ben Snyder, Cal Poly Pomona 2022
- Mentor to Ashley Carpenter, UCLA 2021

TEACHING AND
SELECTED
OUTREACH

- Carnegie ‘Lunch with an Astronomer’ talk 2024
- Presenter, Mount Wilson Observatory STEM program 2023–present
 - Telescope walk-throughs, observing sessions, and demonstrations for a diverse range of student groups from the greater LA area
- Presenter, Carnegie Observatories Open House 2022
- Carnegie Astrophysics Summer Student Internship (CASSI) 2021–present
 - Instruction in astrophysics coding, scientific plotting
 - Science topic presentations at undergraduate level
 - Individual student mentorship
- Teaching Assistant: *The Physical Universe*. Astronomy Department, University of Arizona. 2019–2020
 - Lecture and tutorial assistant, grading and feedback for several 100–200 student sections
- Speaker: *Astronomy on Tap* and *Science Speakeasy*; Tucson 2019
- Project Astro Scientist, Tucson. Classroom partnership with a 4th–5th grade class at Satori Tuition-Free Charter School 2016–2017

PROFESSIONAL
SERVICE

- Science/arXiv ‘tea’ organizer, Carnegie 2022–2024
- Theory Thursdays organizer, Carnegie 2023
- Postdoc representative at Carnegie Observatories 2022–2023
- Carnegie early-career scientist talk series organizer 2022–2023
- Session chair and Chambliss Award judge, AAS 2022
- Hubble Space Telescope TAC External Reviewer 2021–2023
- Referee for MNRAS, AAS Journals, A&A 2018–present
- Prospective student visit organizer. University of Arizona Astronomy Department Spring 2018

PROFESSIONAL
REFERENCES

Prof. Daniel P. Stark

e-mail: dpstark@arizona.edu; phone: +1-520-621-5904

- Associate Professor, University of Arizona,
- Associate Astronomer, Steward Observatory
- Department of Astronomy, 933 North Cherry Avenue, Rm. N204
Tucson, Arizona 85721

Dr. Stéphane Charlot

e-mail: charlot@iap.fr; phone: +33-1-44-32-80-00

- Staff Researcher, Institut d'Astrophysique de Paris
- 98 bis boulevard Arago
75014 Paris, France

Dr. Gwen Rudie

e-mail: gwen@carnegiescience.edu; phone: +1-626-304-0232

- Staff Astronomer, Carnegie Observatories
- 813 Santa Barbara Street
Pasadena, California 91101

Prof. John Chisholm

e-mail: chisholm@austin.utexas.edu; phone: +1-608-234-8623

- Assistant Professor, University of Texas at Austin
- Department of Astronomy, 2515 Speedway Stop C1400
Austin, Texas 78712

Prof. Daniel R. Weisz

e-mail: dan.weisz@berkeley.edu; phone: +1-510-642-5275

- Associate Professor, University of California, Berkeley
- Department of Astronomy, 501 Campbell Hall #3411
Berkeley, California 94720

Prof. Danielle A. Berg

e-mail: daberg@austin.utexas.edu; phone: +1-320-267-4014

- Assistant Professor, University of Texas at Austin
- Department of Astronomy, 2515 Speedway Stop C1400
Austin, Texas 78712