

Andrey Vayner

Curriculum Vitae

Department of Chemistry and Physics
College of Arts and Sciences
Florida Gulf Coast University
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Education

- 2015–2019 **Ph.D. Physics**, *University of California, San Diego*, United States.
Thesis Title: Quasar hosts unveiled by high angular resolution technique
Advisor : Prof. Shelley Wright
- 2013–2015 **M.Sc. Astronomy & Astrophysics**, *University of Toronto*, Ontario, Canada.
Advisors : Prof. Paola Rodriguez-Hidalgo, Prof. Shelley Wright
- 2009–2013 : **H.B.Sc. High distinction**, *University of Toronto*, Ontario, Canada.

Research Interests

High-Redshift Universe, Galaxy Formation & Evolution, Active Galactic Nuclei (AGN), Quasars, AGN Feedback, Adaptive Optics, High Contrast Imaging, Radio Interferometry. Software development for three-dimensional spectroscopy data reduction and analysis.

Employment

Department of Chemistry & Physics, Florida Gulf Coast University

- August 2025 – **Assistant Professor**.
present ○ Focusing on feedback science related to galaxy formation and evolution over cosmic time.

IPAC, California Institute of Technology

- 2024 – July **Postdoctoral Fellow**.
2025 ○ Infrared integral field spectroscopy of hot dust-obscured galaxies, extremely red quasars, and radio galaxies in the early Universe with JWST.
○ Resolved circumgalactic medium studies and the environment of massive galaxies in the early Universe using JWST-NIRSpec, NIRISS, and the Keck Cosmic Web Imager.
○ Novel software development for complex three-dimensional data analysis.
○ JWST-NIRSpec calibrations for high contrast science.

Department of Physics and Astronomy, Johns Hopkins University

- 2019 – 2023 **Postdoctoral Fellow**.
○ JWST early release science.
○ Near-infrared integral field spectroscopy of extremely red quasars, mapping the most extreme outflows detected in the distant Universe.
○ ALMA observations of molecular outflows at $z \sim 2$.
○ Using the Keck Cosmic Web Imager to map the circumgalactic medium around massive $z \sim 2$ galaxies to understand their subsequent evolution from cosmic noon to present day.

Department of Physics, UC San Diego

- 2015 – 2019 **Graduate Student Researcher**.
○ Using laser guide star adaptive optics observation in combination with integral field spectroscopy to resolve host galaxies of distant quasars, to study the co-evolution of supermassive black holes and the galaxies that harbor them.
○ Constraining molecular gas reservoirs of distant quasar host galaxies through CO spectroscopy with Atacama Large Millimeter/Submillimeter Array (ALMA)

Department of Astronomy & Astrophysics, University of Toronto

2013–2015 Graduate Student Researcher.

- Using high-resolution optical spectroscopy of high-redshift quasars to monitor the origin and evolution of winds from the vicinity of the black hole.
- Multiwavelength observations of radio-loud quasars with VLA, HST, Chandra, Herschel, SDSS. Constructing sample for follow-up observations with laser guide star adaptive optics and integral field spectroscopy.

Dunlap Institute for Astronomy and Astrophysics, University of Toronto

2012,2013 Summer undergraduate research assistant.

- Resolving Host Galaxies of $z \sim 2$ Quasars using Adaptive Optics and Integral Field Spectroscopy
- Reduced and analyzed data from the Keck & Gemini telescopes. Wrote routines for PSF subtraction to disentangle the bright unresolved quasar emission from the faint underlying host galaxy.

Fellowships & Awards

- 2023 NASA Postdoctoral Program (NPP) Fellowship
- 2020 ALMA ambassador
- 2013 The Royal Astronomical Society of Canada Gold Medal
- 2012 Professor C.A Chant Scholarship for Astronomy
- 2012 Natural Science and Engineering Research Council of Canada (NSERC) Undergraduate Student Research Award

Talks

SEMINARS & INVITED TALKS

- March 2024 University of South Carolina, Physics Colloquium, *Probing Key Drivers of Massive Galaxy Formation in the Distant Universe*
- October 2023 Goddard Space Flight Center, NASA-GSFC AGN seminar, Maryland, *"Extremely Red Quasars at Cosmic Noon with JWST."*
- May 2022 California Institute of Technology Astronomy Tea Talk, Pasadena, California, *"Gas Flows in Massive Galaxies at Cosmic Noon with Integral Field Spectroscopy."*
- November 2021 University of Maryland, CTC Seminar, College Park, Maryland *"Extremely red and obscured quasars with JWST integral field spectroscopy"*
- October 2021 Space Telescope Science Institute, JHU/STScI JWST Science Symposium, Baltimore, Maryland *"Extremely red and obscured quasars with JWST integral field spectroscopy"*
- September 2019 Johns Hopkins University, Department Seminar, Baltimore, Maryland *"Quasar host galaxies and their environments with multi-wavelength 3D spectroscopy"*
- October 2018 UC Irvine, Astronomy Seminar, Irvine, California, *"Quasar host galaxies and their environments with multi-wavelength 3D spectroscopy"*
- October 2018 Carnegie Observatories, Lunch Talk, Pasadena, California, *"Quasar host galaxies and their environments with multi-wavelength 3D spectroscopy"*
- October 2018 UC Berkeley, Lunch Talk, Berkeley, California, *"Quasar hosts Unveiled by high Angular Resolution Techniques"*
- November 2017 UC Los Angeles, Astronomy Seminar, Los Angeles, California, *"Quasar hosts Unveiled by high Angular Resolution Techniques"*
- November 2017 California Institute of Technology Astronomy Tea Talk, Pasadena, California, *"Quasar hosts Unveiled by high Angular Resolution Techniques"*

CONFERENCE TALKS AND POSTERS

- July 2024 Talk, Cosmic Odysseys The Interstellar Medium of Galaxies and AGN since Cosmic Dawn, Crete, Greece, *"Feedback in Dust-Obscured Galaxies in the Distant Universe with JWST"*
- July 2023 Talk, New Views on Feedback & the Baryon Cycle in Galaxies, Healesville, Victoria, Australia, *"Feedback in an Extremely Red Quasar Host at Cosmic Noon with JWST"*
- June 2023 Talk, AGN Winds on the Chesapeake, Easton, MD, USA, *"Extremely Red Quasars at Cosmic Noon with JWST"*
- March 2022 Talk, Space Telescope Science Institute, Large-Volume Spectroscopic Analyses of AGN and Star Forming Galaxies in the Era of JWST, Baltimore, Maryland *"Fitting rest-frame UV and optical IFS data with Q3Dfit for JWST"*
- March 2020 Talk, IAU Symposium 359: Galaxy Evolution and Feedback Across Different Environments (GALFEED), Bento Gonçalves, RS, Brazil *"Distant quasar host galaxies and their environments with multi-wavelength 3D spectroscopy"*
- November 2018 Talk, Center for Adaptive Optics Fall Retreat, Lake Arrowhead, California, *"Challenges for flux calibrating AO-assisted integral field spectroscopy observations"*
- September 2018 Poster, Keck Science Meeting, Caltech, California, *"OSIRIS and KCWI reveal feeding and feedback in distant Quasar Host Galaxies"*
- October 2017 Talk, Center for Adaptive Optics Fall Retreat, Lake Arrowhead, California, *"Quasar host galaxies and point spread function reconstruction"*
- September 2017 Talk, Keck Science Meeting, Santa Cruz, California, *"Quasar hosts Unveiled by high Angular Resolution Techniques (QUART)"*
- September 2016 Poster, Keck Science Meeting, Caltech, California, *"Resolving distant quasar host galaxies with high angular resolution techniques"*
- August 2016 Poster, Mapping the Pathways of Galaxy Transformation Across Time and Space, Catalina Island, California, *"Resolving distant quasar host galaxies with high angular resolution techniques"*
- June 2016 Talk, American Astronomical Society 228 Meeting, San Diego, California, *"QUART: Quasar hosts Unveiled by high Angular Resolution Techniques"*
- June 2014 Poster, Powerful AGN conference, Port Douglas, Queensland, Australia, *"Providing stringent star formation rate limits of $z \sim 2$ QSO host galaxies at high angular resolution"*
- June 2014 Talk, Canadian Astronomical Society Annual General Meeting, Quebec City, Quebec, Canada, *"Constraining the Causes of Dramatic Variability in Newly Emerged Quasar Outflows"*
- January 2013 Poster, American Astronomical Society 221 Meeting, Long Beach, California *"Resolving Host Galaxies of $z=2$ Quasars Using Adaptive Optics and Integral Field Spectroscopy"*

Telescope Proposals and Research Grants

James Webb Space Telescope, Col, Cycle 4

Approved for 11.6 hours - *Quenching physics and age demographics of stellar populations in a massive radio-loud AGN host galaxy at $z \sim 3.5$*

James Webb Space Telescope, Col, Cycle 4

Approved for 42.2 hours - *MILAN - MIRI LRS Program of AGN at Cosmic Noon*

Mt. Palomar, 200-inch Hale Telescope, PI, 2024B, 2025A

6 nights - *The Circumgalactic Medium of Hot Dust Obscured Galaxies at Cosmic Noon*

James Webb Space Telescope, Col, Cycle 2

Approved for 5.3 hours - *Deep grism spectroscopy of the complex environment around an extremely red quasar within an ultramassive host at $z=3$*

James Webb Space Telescope, Col, Cycle 2

Approved for 11.0 hours - *An Empirical Calibration of the NIRSpec IFU Point Spread Function to Enable High Contrast Imaging Spectroscopy*

Gemini North Observatory, PI, 2022B

Approved for 13 hours - *Extreme quasar feedback at the peak of the galaxy formation epoch*

W.M Keck Observatory (KCWI), NASA 22A - PI

1 night, \$17K - *Winds in the circumgalactic medium of extremely red quasars.*

James Webb Space Telescope, PI, Cycle 1

Approved for 21 hours - *Extreme quasar feedback at the peak of the galaxy formation epoch*

James Webb Space Telescope, Col, Cycle 1

Approved for 24.6 hours - *Zooming into the monster's mouth: tracing feedback from their hosts to circumgalactic medium in $z=3.5$ radio-loud AGN*

James Webb Space Telescope, Col, Cycle 1

Approved for 8.8 hours - *Quasar Feedback in Action: The Multiphase and Multiscale Outflow of the Most Luminous Quasar in the Local Universe*

NASA, Astrophysics Data Analysis Program, Col, 2020

\$435K - *Feeding and feedback in the circumgalactic medium at the peak epoch of quasar activity.*

Gemini North Observatory, PI, 2020A

Approved for 3 hours - *Extreme quasar feedback at the peak of the galaxy formation epoch*

Atacama Large Millimeter/Submillimeter Array (ALMA), PI, Cycle 2

60.88 minutes observed - *Probing The Star Burst Phase of Quasar Host Galaxies*

Atacama Large Millimeter/Submillimeter Array (ALMA), PI, Cycle 3

79 minutes observed - *Unique high resolution & multi-wavelength study of a $z=1.4$ quasar host galaxy*

Atacama Large Millimeter/Submillimeter Array (ALMA), PI, Cycle 5

Approved for 18 hours (Grade B) - *Searching for feedback with 3D multi-phase interstellar medium study in $z\sim 2$ quasar host galaxies*

W.M Keck Observatory (OSIRIS-LGS), Col [Ph.D. Thesis], 2015-2017

9.5 nights total - *Resolving Star Formation and Nebular Line Ratios in Host Galaxies of High-Redshift Quasars*

W.M Keck Observatory (KCWI), Col [Ph.D. Thesis], 2017-2020

7.5 night - *Resolving distant quasar host galaxies and their environments*

Telescope Observing Experience

W.M Keck Observatory:

Keck I (OSIRIS-LGS/NGS): 17.0 nights

Keck I (MOSFIRE): 5.0 nights

Keck II (NIRC2-LGS/NGS): 4.0 nights

Keck II (KCWI): 11 nights

Lick Observatory:

Nickel: 2 nights

Mt. Palomar:

200-inch Hale Telescope: 6 nights

Publications

Total refereed publications:40. First author publications:10. * = student advised. Boldface = most impactful. First-author H-index: 9

REFEREED FIRST AUTHOR JOURNAL ARTICLES

A. Vayner, T. Díaz-Santos, P. R. M. Eisenhardt, D. Stern, L. Armus, D. Anglés-Alcázar, R. J. Assef, R. Fernández Aranda, A. W. Blain, H. D. Jun, C.-W. Tsai, N. C. Roy, D. Brisbin, C. D. Ferkinhoff, M. Aravena, J. González-López, G. Li, M. Liao, D. Shobhana, J. Wu, and D. Zewdie. **Powerful nuclear outflows and circumgalactic medium shocks driven by the most luminous quasar in the Universe.** *arXiv e-prints*, page arXiv:2412.02862, Dec. 2024.

A. Vayner, S. A. Wright, T. Do, J. E. Larkin, L. Armus, and S. C. Gallagher. Providing Stringent Star Formation Rate Limits of $z \sim 2$ QSO Host Galaxies at High Angular Resolution. *The Astrophysical Journal*, 821(1):64, Apr. 2016.

A. Vayner, S. A. Wright, N. Murray, L. Armus, A. Boehle, M. Cosens, J. E. Larkin, E. Mieda, and G. Walth. A Spatially Resolved Survey of Distant Quasar Host Galaxies. I. Dynamics of Galactic Outflows. *The Astrophysical Journal*, 919(2):122, Oct. 2021.

A. Vayner, S. A. Wright, N. Murray, L. Armus, A. Boehle, M. Cosens, J. E. Larkin, E. Mieda, and G. Walth. A Spatially Resolved Survey of Distant Quasar Host Galaxies. II. Photoionization and Kinematics of the ISM. *The Astrophysical Journal*, 910(1):44, Mar. 2021.

A. Vayner, S. A. Wright, N. Murray, L. Armus, J. E. Larkin, and E. Mieda. **Galactic-scale Feedback Observed in the 3C 298 Quasar Host Galaxy.** *The Astrophysical Journal*, 851(2):126, Dec. 2017.

A. Vayner, N. Zakamska, S. A. Wright, L. Armus, N. Murray, and G. Walth. **Multiphase Outflows in High-redshift Quasar Host Galaxies.** *The Astrophysical Journal*, 923(1):59, Dec. 2021.

A. Vayner, N. L. Zakamska, Y. Ishikawa, S. Sankar, D. Wylezalek, D. S. N. Rupke, S. Veilleux, C. Bertemes, J. K. Barrera-Ballesteros, H.-W. Chen, N. Diachenko, A. D. Goulding, J. E. Greene, K. N. Hainline, F. Hamann, T. Heckman, S. D. Johnson, H. X. Grace Lim, W. Liu, D. Lutz, N. Lützgendorf, V. Mainieri, R. McCrory, G. Murphree, N. P. H. Nesvadba, P. Ogle, E. Sturm, and L. Whitesell. **First Results from the JWST Early Release Science Program Q3D: Ionization Cone, Clumpy Star Formation, and Shocks in a $z = 3$ Extremely Red Quasar Host.** *The Astrophysical Journal*, 955(2):92, Oct. 2023.

A. Vayner, N. L. Zakamska, Y. Ishikawa, S. Sankar, D. Wylezalek, D. S. N. Rupke, S. Veilleux, C. Bertemes, J. K. Barrera-Ballesteros, H.-W. Chen, N. Diachenko, A. D. Goulding, J. E. Greene, K. N. Hainline, F. Hamann, T. Heckman, S. D. Johnson, H. X. Grace Lim, W. Liu, D. Lutz, N. Lützgendorf, V. Mainieri, R. McCrory, G. Murphree, N. P. H. Nesvadba, P. Ogle, E. Sturm, and L. Whitesell. First Results from the JWST Early Release Science Program Q3D: Powerful Quasar-driven Galactic Scale Outflow at $z = 3$. *The Astrophysical Journal*, 960(2):126, Jan. 2024.

A. Vayner, N. L. Zakamska, R. A. Riffel, R. Alexandroff, M. Cosens, F. Hamann, S. Perrotta, D. S. N. Rupke, T. S. Bergmann, S. Veilleux, G. Walth, S. Wright, and D. Wylezalek. Powerful winds in high-redshift obscured and red quasars. *Monthly Notices of the Royal Astronomical Society*, 504(3):4445–4459, July 2021.

A. Vayner, N. L. Zakamska, S. Sabhlok, S. A. Wright, L. Armus, N. Murray, G. Walth, and Y. Ishikawa. Cold mode gas accretion on two galaxy groups at $z \sim 2$. *Monthly Notices of the Royal Astronomical Society*, 519(1):961–979, Feb. 2023.

REFEREED CO-AUTHOR JOURNAL ARTICLES

R. J. Assef, M. Stalevski, L. Armus, F. E. Bauer, A. Blain, M. Brightman, T. Díaz-Santos, P. R. M. Eisenhardt, R. Fernández-Aranda, H. D. Jun, M. Liao, G. Li, L. R. Martin, E. Shablovinskaia, D. Shobhana, D. Stern, C.-W. Tsai, **A. Vayner**, D. J. Walton, J. Wu, and D. Zewdie. A Massive Gas Outflow Outside the Line-of-Sight: Imaging Polarimetry of the Blue Excess Hot Dust Obscured Galaxy W0204-0506. *arXiv e-prints*, page arXiv:2504.15913, Apr. 2025.

C. Bertemes, D. Wylezalek, D. S. N. Rupke, N. L. Zakamska, S. Veilleux, B. Beckmann, **A. Vayner**, S. Sankar, Y. Ishikawa, N. Diachenko, W. Liu, Y. C. Chen, J. Seebeck, D. Lutz, and G. Liu. JWST ERS Program Q3D: The pitfalls of virial black hole mass constraints shown for a $z \sim 3$ quasar with an ultramassive host. *Astronomy & Astrophysics*, 693:A176, Jan. 2025.

M. C. Chen, H.-W. Chen, M. Rauch, **A. Vayner**, W. Liu, D. S. N. Rupke, J. E. Greene, N. L. Zakamska, D. Wylezalek, G. Liu, S. Veilleux, N. P. H. Nesvadba, and C. Bertemes. Resolving Turbulence Drivers in Two Luminous Obscured Quasars with JWST/NIRSpec Integral Field Unit. *The Astrophysical Journal Letters*, 978(2):L18, Jan. 2025.

Y.-C. Chen, Y. Ishikawa, N. L. Zakamska, X. Liu, Y. Shen, H.-C. Hwang, D. Rupke, **A. Vayner**, A. C. Gross, W. Liu, D. Wylezalek, S. Veilleux, C. Bertemes, N. Diachenko, and S. Sankar. VODKA-JWST: A 3.8 kpc Dual Quasar at Cosmic Noon in a Powerful Starburst Galaxy with JWST/MIRI Integral Field Unit. *The Astrophysical Journal*, 968(2):92, June 2024.

M. Cosens, S. A. Wright, E. Mieda, N. Murray, L. Armus, T. Do, J. E. Larkin, K. Larson, G. Martinez, G. Walth, and **A. Vayner**. Size-Luminosity Scaling Relations of Local and Distant Star-forming Regions. *The Astrophysical Journal*, 869(1):11, Dec. 2018.

M. Cosens, S. A. Wright, N. Murray, L. Armus, K. Sandstrom, T. Do, K. Larson, G. Martinez, S. Sabhlok, **A. Vayner**, and J. Wiley. Kinematics and Feedback in H II Regions in the Dwarf Starburst Galaxy IC 10. *The Astrophysical Journal*, 929(1):74, Apr. 2022.

R. Fernández Aranda, T. Díaz Santos, E. Hatziminaoglou, M. Aravena, D. Stern, L. Armus, R. J. Assef, A. W. Blain, V. Charmandaris, R. Decarli, P. R. M. Eisenhardt, C. Ferkinhoff, J. González-López, H. D. Jun, G. Li, M. Liao, V. Shevill, D. Shobhana, C.-W. Tsai, **A. Vayner**, J. Wu, and D. Zewdie. Spatially resolved dust properties over 50 kpc in a hyperluminous galaxy merger at $z = 4.6$. *arXiv e-prints*, page arXiv:2502.10503, Feb. 2025.

J. Gillette, M. W. Lau, F. Hamann, S. Perrotta, D. S. N. Rupke, D. Wylezalek, N. L. Zakamska, and **A. Vayner**. Compact and quiescent circumgalactic medium and Ly α haloes around extremely red quasars. *Monthly Notices of the Royal Astronomical Society*, 526(2):2578–2595, Dec. 2023.

Y. Ishikawa, A. D. Goulding, N. L. Zakamska, F. Hamann, **A. Vayner**, S. Veilleux, and D. Wylezalek. X-ray analysis of SDSS J165202.60+172852.4, an obscured quasar with outflows at peak galaxy formation epoch. *Monthly Notices of the Royal Astronomical Society*, 502(3):3769–3779, Apr. 2021.

Y. Ishikawa, N. L. Zakamska, Y. Shen, X. Liu, Y.-C. Chen, H.-C. Hwang, **A. Vayner**, D. S. N. Rupke, S. Veilleux, D. Wylezalek, A. C. Gross, S. Sankar, and N. Diachenko. VODKA-JWST: Synchronized Growth of Two Supermassive Black Holes in a Massive Gas Disk? A 3.8 kpc Separation Dual Quasar at Cosmic Noon with the NIRSpec Integral Field Unit. *The Astrophysical Journal*, 982(1):22, Mar. 2025.

S. Laha, R. Smith, P. Tzanavaris, T. Kallman, S. Veilleux, F. Tombesi, G. Kriss, M. Guainazzi, M. Gaspari, J. Kaastra, A. Markowitz, M. Crenshaw, E. Behar, K. Fukumura, A. L. Longinotti,

- A. Rozanska, J. Ebrero, G. Ferland, C. Ricci, C. Done, D. Proga, M. Revalski, and **A. Vayner**. The physics and astrophysics of X-ray outflows from Active Galactic Nuclei. , 51(3):75, May 2019.
- M. W. Lau, S. Perrotta, F. Hamann, J. Gillette, D. S. N. Rupke, **A. Vayner**, N. L. Zakamska, and D. Wylezalek. [O III] $\lambda 5007$ emissions in extremely red quasars (ERQs) are compact. *Monthly Notices of the Royal Astronomical Society*, 532(2):2044–2064, Aug. 2024.
- M. Liao, R. J. Assef, C.-W. Tsai, M. Aravena, R. Fernández Aranda, A. W. Blain, T. Díaz-Santos, P. Eisenhardt, J. González-López, H. D. Jun, X. Li, G. Li, L. R. Martin, A. Posses, D. Shobhana, M. Solimano, D. Stern, **A. Vayner**, J. Wu, and D. Zewdie. Resolving the black hole sphere of influence in a hyper-luminous obscured quasar at redshift 4.6. *arXiv e-prints*, page arXiv:2504.13409, Apr. 2025.
- C. Liu, C.-W. Tsai, P. R. M. Eisenhardt, H. D. Jun, G. Li, J. Wu, R. J. Assef, A. W. Blain, M. Cosens, T. Díaz-Santos, R. Fernández Aranda, L. Hao, M. Liao, S. Liu, D. Stern, **A. Vayner**, S. Wright, and S. Yeh. Multicomponent Ionized Gas Outflows in the Hot Dust-obscured Galaxy W2026+0716 with Keck/OSIRIS. *The Astrophysical Journal*, 986(1):26, June 2025.
- W. Liu, X. Fan, J. Yang, E. Bañados, F. Wang, J. Wolf, A. J. Barth, T. Costa, R. Decarli, A.-C. Eilers, F. Loiacono, Y. Shen, E. P. Farina, X. Jin, H. D. Jun, M. Li, A. Lupi, M. A. Marshall, Z. Pan, M. Pudoka, M.-Y. Zhuang, J. B. Champagne, H. Li, F. Sun, W. L. Tee, **A. Vayner**, and H. Zhang. Fast Outflow in the Host Galaxy of the Luminous $z = 7.5$ Quasar J1007+2115. *arXiv e-prints*, page arXiv:2409.13189, Sept. 2024.
- W. Liu, S. Veilleux, S. Sankar, D. S. N. Rupke, N. L. Zakamska, D. Wylezalek, **A. Vayner**, C. Bertemes, Y. Ishikawa, Y.-C. Chen, J. E. Greene, T. Heckman, G. Liu, H.-W. Chen, D. Lutz, S. D. Johnson, N. P. H. Nesvadba, P. Ogle, N. Diachenko, A. D. Goulding, K. N. Hainline, F. Hamann, H. X. G. Lim, N. Lützgendorf, V. Mainieri, R. McCrory, G. Murphree, L. Shen, E. Sturm, and L. Whitesell. First Results from the JWST Early Release Science Program Q3D: The Fast Outflow in a Red Quasar at $z = 0.44$. *The Astrophysical Journal*, 980(1):31, Feb. 2025.
- K. E. Lockhart, T. Do, J. E. Larkin, A. Boehle, R. D. Campbell, S. Chappell, D. Chu, A. Ciurlo, M. Cosens, M. P. Fitzgerald, A. Ghez, J. R. Lu, J. E. Lyke, E. Mieda, A. R. Rudy, **A. Vayner**, G. Walth, and S. A. Wright. Characterizing and Improving the Data Reduction Pipeline for the Keck OSIRIS Integral Field Spectrograph. *The Astronomical Journal*, 157(2):75, Feb. 2019.
- L. R. Martin, A. W. Blain, T. Díaz-Santos, R. J. Assef, C.-W. Tsai, H. D. Jun, P. R. M. Eisenhardt, J. Wu, **A. Vayner**, and R. F. Aranda. CO spectra of the ISM in the Host Galaxies of the most luminous WISE-selected AGNs. *Monthly Notices of the Royal Astronomical Society*, 534(1):978–994, Oct. 2024.
- S. Ragland, T. J. Dupuy, L. Jolissaint, P. L. Wizinowich, J. R. Lu, M. A. van Dam, G. B. Berriman, W. Best, C. R. Gelino, A. M. Ghez, M. C. Liu, J. A. Mader, A. Vayner, G. Witzel, and S. A. Wright. Status of point spread function determination for Keck adaptive optics. In L. M. Close, L. Schreiber, and D. Schmidt, editors, *Adaptive Optics Systems VI*, volume 10703 of *Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series*, page 107031J, July 2018.
- D. S. N. Rupke, D. Wylezalek, N. L. Zakamska, S. Veilleux, C. Bertemes, Y. Ishikawa, W. Liu, S. Sankar, **A. Vayner**, H. X. Grace Lim, R. McCrory, G. Murphree, L. Whitesell, L. Shen, G. Liu, J. K. Barrera-Ballesteros, H.-W. Chen, N. Diachenko, A. D. Goulding, J. E. Greene, K. N. Hainline, F. Hamann, T. Heckman, S. D. Johnson, D. Lutz, N. Lützgendorf, V. Mainieri, N. P. H. Nesvadba, P. Ogle, and E. Sturm. First Results from the JWST Early Release Science Program Q3D: Benchmark Comparison of Optical and Mid-infrared Tracers of a Dusty, Ionized Red Quasar Wind at $z = 0.435$. *The Astrophysical Journal Letters*, 953(2):L26, Aug. 2023.

- *S. Sabhlok, S. A. Wright, **A. Vayner**, S. Simonaitis-Boyd, N. Murray, L. Armus, M. Cosens, J. Wiley, and M. Kriek. Circumgalactic Environments Around Distant Quasars 3C 9 and 4C 05.84. *The Astrophysical Journal*, 964(1):84, Mar. 2024.
- *S. Sankar, N. L. Zakamska, D. S. N. Rupke, W. Liu, D. Wylezalek, S. Veilleux, C. Bertemes, N. Diachenko, Y.-C. Chen, Y. Ishikawa, **A. Vayner**, N. P. H. Nesvadba, G. Liu, A. D. Goulding, and D. Lutz. First results from the JWST Early Release Science Program Q3D: AGN photoionization and shock4 ionization in a red quasar at $z = 0.45$. *arXiv e-prints*, page arXiv:2410.22470, Oct. 2024.
- J. Seebeck, S. Veilleux, W. Liu, D. S. N. Rupke, **A. Vayner**, D. Wylezalek, N. L. Zakamska, and C. Bertemes. Combined JWST–MUSE Integral Field Spectroscopy of the Most Luminous Quasar in the Local Universe, PDS 456. *The Astrophysical Journal*, 976(2):240, Dec. 2024.
- S. Simonaitis-Boyd, S. Sabhlok, S. A. Wright, **A. Vayner**, M. Cosens, and J. Wiley. Deriving Stellar Parameters for High-redshift ($1.2 \leq z \leq 2.6$) Galaxies Using CIGALE. *Research Notes of the American Astronomical Society*, 9(4):72, Apr. 2025.
- S. Veilleux, W. Liu, **A. Vayner**, D. Wylezalek, D. S. N. Rupke, N. L. Zakamska, Y. Ishikawa, C. Bertemes, J. K. Barrera-Ballesteros, H.-W. Chen, N. Diachenko, A. D. Goulding, J. E. Greene, K. N. Hainline, F. Hamann, T. Heckman, S. D. Johnson, H. X. Grace Lim, D. Lutz, N. Lützgendorf, V. Mainieri, R. Maiolino, R. McCrory, G. Murphree, N. P. H. Nesvadba, P. Ogle, S. Sankar, E. Sturm, and L. Whitesell. First Results from the JWST Early Release Science Program Q3D: The Warm Ionized Gas Outflow in z 1.6 Quasar XID 2028 and Its Impact on the Host Galaxy. *The Astrophysical Journal*, 953(1):56, Aug. 2023.
- G. Walth, A. Surya, N.-E. Rundquist, S. A. Wright, M. Cosens, **A. Vayner**, E. Oh, J. A. Llamas, W. Skidmore, E. M. Chisholm, and J. E. Larkin. The Infrared Imaging Spectrograph (IRIS) for TMT: exposure time calculator for IRIS. In J. C. Guzman and J. Ibsen, editors, *Software and Cyberinfrastructure for Astronomy VI*, volume 11452 of *Society of Photo-Optical Instrumentation Engineers (SPIE) Conference Series*, page 1145236, Dec. 2020.
- W. Wang, C. De Breuck, D. Wylezalek, J. Vernet, M. D. Lehnert, D. Stern, D. S. N. Rupke, N. P. H. Nesvadba, **A. Vayner**, N. L. Zakamska, L. Lin, P. Kukreti, B. D. de Oliveira, and J. T. Groth. JWST + ALMA ubiquitously discover companion systems within 18 kpc around four $z \approx 3.5$ luminous radio-loud AGN. *Astronomy & Astrophysics*, 696:A88, Apr. 2025.
- W. Wang, D. Wylezalek, C. De Breuck, J. Vernet, D. S. N. Rupke, N. L. Zakamska, **A. Vayner**, M. D. Lehnert, N. P. H. Nesvadba, and D. Stern. JWST discovers an AGN ionization cone but only weak radiatively driven feedback in a powerful $z \approx 3.5$ radio-loud AGN. *Astronomy & Astrophysics*, 683:A169, Mar. 2024.
- D. Wylezalek, **A. Vayner**, D. S. N. Rupke, N. L. Zakamska, S. Veilleux, Y. Ishikawa, C. Bertemes, W. Liu, J. K. Barrera-Ballesteros, H.-W. Chen, A. D. Goulding, J. E. Greene, K. N. Hainline, F. Hamann, T. Heckman, S. D. Johnson, D. Lutz, N. Lützgendorf, V. Mainieri, R. Maiolino, N. P. H. Nesvadba, P. Ogle, and E. Sturm. **First Results from the JWST Early Release Science Program Q3D: Turbulent Times in the Life of a z 3 Extremely Red Quasar Revealed by NIRSpec IFU**. *The Astrophysical Journal Letters*, 940(1):L7, Nov. 2022.
- *Y. Ishikawa, N. L. Zakamska, Y. Shen, X. Liu, Y.-C. Chen, H.-C. Hwang, **A. Vayner**, S. Veilleux, D. S. N. Rupke, D. Wylezalek, A. C. Gross, S. Sankar, and N. Diachenko. VODKA-JWST: Synchronized growth of two SMBHs in a massive gas disk? A 3.8 kpc separation dual quasar at cosmic noon with JWST NIRSpec IFU. *arXiv e-prints*, page arXiv:2403.08098, Mar. 2024.
- D. Zewdie, R. J. Assef, T. Lambert, C. Mazzucchelli, S. Ilani Loubser, M. Aravena, J. González-López, H. D. Jun, C.-W. Tsai, D. Stern, G. Li, R. Fernández Aranda, T. Díaz-Santos, P. R. M.

Eisenhardt, **A. Vayner**, L. R. Martin, A. W. Blain, and J. Wu. Overdensity of Lyman-break galaxy candidates around hot-dust-obscured galaxies. *Astronomy & Astrophysics*, 694:A121, Feb. 2025.

SOFTWARE

J. Lyke, T. Do, A. Boehle, R. Campbell, S. Chappell, M. Fitzgerald, T. Gasawy, C. Iserlohe, A. Krabbe, J. Larkin, K. Lockhart, J. Lu, E. Mieda, M. McElwain, M. Perrin, A. Rudy, B. Sitarski, **A. Vayner**, G. Walth, J. Weiss, T. Wizanski, and S. Wright. OSIRIS Toolbox: OH-Suppressing InfraRed Imaging Spectrograph pipeline. Astrophysics Source Code Library, record ascl:1710.021, Oct. 2017.

D. Rupke, D. Wylezalek, N. Zakamska, S. Veilleux, **A. Vayner**, C. Bertemes, Y. Ishikawa, W. Liu, H. X. G. Lim, G. Murphree, L. Whitesell, R. McCrory, and C. Anicetti. q3dfit: PSF decomposition and spectral analysis for JWST-IFU spectroscopy. Astrophysics Source Code Library, record ascl:2310.004, Oct. 2023.

Membership & Services

Department services

- March 2022 SOC, Space Telescope Science Institute, Large-Volume Spectroscopic Analyses of AGN and Star Forming Galaxies in the Era of JWST
- 2020 ALMA Ambassador
- 2020 - 2022 Astrocoffee event organizer, Johns Hopkins University Physics & Astronomy
- 2014 Graduate Student Representative, Dunlap Institute Management Committee

Peer reviewer

- 2018-present The Astrophysical Journal, MNRAS, A&A, Nature. Total~15

Working groups

- 2019-present Q3D software development for JWST integral field unit data analysis
- 2018-present Thirty Meter Telescope (TMT) Infrared Imaging Spectrograph (IRIS) Science Team Junior Member
- 2014-present OSIRIS data reduction pipeline team
- 2016-2019 Keck PSF-R commissioning science team

Data Experience & Skills

Instrument Data reduction & Analysis:

JWST: NIRSpec, NIRCarn, MIRI MRS & imaging, NIRISS slitless spectroscopy

W.M Keck Observatory: OSIRIS, NIRC2, LRIS, KCWI

Gemini: NIFS

ALMA: Experience reducing mm interferometric data with CASA

Chandra Space Observatory: CIAO, ChaRT, MARX

Extensive analysis of optical and near-infrared spectroscopic data. Experience with mid/far-infrared photometry and SEDs

Languages & Software:

Python, IDL, LaTeX

TEACHING & PUBLIC OUTREACH

The 18th Heidelberg Summer School, Invited lecturer, University of Heidelberg

September 2023 Presented a lecture on introduction to active galactic nuclei feedback in context of galaxy evolution with a summary of JWST results in the first year of science operations. Presented our early-release science software for JWST designed to analyze integral field spectroscopy data. Trained the students to use it on JWST near-infrared integral field spectroscopy data through developed Python Jupyter notebooks.

University of California, San Diego

2017-2018 Teaching Assistant PHYS 164: Observational Astrophysics Leading tutorials, marking, telescope observing sessions

Winter-Spring 2017 Professional Development Program, UC Santa Cruz: As part of the Professional Development Program, I attended the Institute for Scientist & Engineer Educators (ISEE) inquiry and design institute, where I led a team to design an inquiry-based activity for summer undergraduate researchers. Students focused on the STEM practice of designing and carrying out investigations. The content of the two-day activity focused on statistics and signal to noise ratio calculation with an introduction to future astronomical observatories.

University of Toronto

Fall 2013-2015 Teaching Assistant AST101: The Sun and its Neighbours. Leading tutorials, planetarium operator & grading

Winter 2014 Teaching Assistant AST201: Stars and Galaxies. Leading tutorials, planetarium operator & grading

Winter 2015 Teaching Assistant PMU199: Great Astronomical Issues. Assisting students with astronomical observations using remote telescopes

2013-2015 Free Monthly Astronomy Public Tours. Media Relations Director: Oversaw monthly advertisements, prepared posters and website graphics, communicated with advertisers, and sent monthly newsletters to the public.

2012-2013 Free Monthly Astronomy Public Tours. Telescope operator: 8", 10" and 16" telescope guide for public observing.

Summers 2013, 2014 Sidewalk Astronomy. Assisted in operating solar telescopes for observing sessions once a week during lunch hour in downtown Toronto.

Mentoring

2013-2014 Physics undergraduate mentoring program. Mentored senior undergraduate physics & astronomy student

2015-2016 Astronomy graduate student mentorship program. Organized and ran a mentorship program for incoming astronomy graduate students

Student Supervision

Reagen Leimbach, 2024 - present, co-supervision with Prof. Shelley Wright, UC San Diego

Nadiia Diachenko, 2022 - 2024, co-supervision with Prof. Nadia Zakamska, Johns Hopkins University

Swetha Sankar, 2022 - present, co-supervision with Prof. Nadia Zakamska, Johns Hopkins University

Yuzo Ishikawa, 2019 - 2024, co-supervision with Prof. Nadia Zakamska, Johns Hopkins University

Sanchit Sabhlok, 2019 - 2024, co-supervision with Prof. Shelley Wright, UC San Diego

Media coverage

October 20, 2022 JHU Hub "Webb reveals unprecedented glimpse of merging galaxies"

- October 20, European Space Agency (ESA), "Webb uncovers dense cosmic knot in the early Universe"
2022
- October 20, NASA, "NASA's Webb Uncovers Dense Cosmic Knot in The Early Universe"
2022
- October 20, Gizmodo, "Webb Telescope Finds Polychrome Quasar Surrounded by Ancient Galaxies"
2022
- October 20, CNET, "NASA Webb Telescope Reveals Dramatic Galaxy Merger Around 'Monster' Black Hole"
2022
- December 21, Newsweek magazine, "Supermassive black hole hiding at the heart of a galaxy changes the whole neighborhood"
2017
- December 21, Engadget, "Supermassive black holes may control galaxy formation"
2017
- December 24, Big Island Now, "Study Suggests Black Holes can Control Galaxy Formation"
2017