





Dr. Tim B. Miller

CIERA
Northwestern University
1800 Sherman Ave. Evanston, IL 60201

timothy.miller@northwestern.edu
tbmiller-astro.github.io
Citizenship: Canada

Research Interests	Galaxy Evolution; Galaxy morphology; Bayesian Inference; Machine learning	
Education & Experience	<i>Postdoctoral Fellow</i>	Fall 2023-Present
	Northwestern University, IL, USA Center for Interdisciplinary Exploration and Research in Astrophysics (CIERA)	
	<i>Ph.D, Astronomy</i>	Awarded July 2023
	Yale University, CT, USA Supervisor: Pieter van Dokkum Thesis: A New View of Galaxy Morphology	
	<i>Masters of Science, Physics</i>	Awarded August 2017
	Dalhousie University, Nova Scotia, Canada Supervisor: Scott Chapman Thesis: <i>Star Formation Rate Indicators in the FIRE Simulations & SPT2349-56: A Massive and Active Proto-cluster</i>	
	Visiting Researcher	2015-2016
	California Institute of Technology Supervisors: Phil Hopkins and Chris Hayward	
	<i>Bachelor of Science, First Class Honors in Physics</i>	Awarded May 2015
	Dalhousie University, Nova Scotia, Canada	
Scholarships & Awards	CIERA Fellowship	2023 - 2026
	· Independent Postdoctoral Fellowship	
	Gruber Science Fellowship	2017 - 2020
	· Award to highly ranked Ph.D applicants	
	Killam Predoctoral Scholarship	2015 - 2017
	· University wide scholarship for M.Sc program	
	NSERC Canada Graduate Scholarship	2016
	· Federal scholarship spanning many areas of study	
	Nova Scotia Graduate Scholarship	2016 - 2017
	· Province wide scholarship for M.Sc program	
Conferences & Seminars	Dwarf Galaxies in the LSST Era - U. Chicago, KICP	July, 2024
	Rare Gems in Big Data - NOIRLab	May 2024
	Extragalactic Seminar - Arizona State University	Jun. 2023
	Early results from the JWST - Cambridge	Mar. 2023
	AAS 241 - Dissertation Talk	Jan. 2023
	First Results from JWST - STScI	Dec. 2022
	Tea Talk - Caltech	Oct. 2022

	Galaxies and AGN journal club - John Hopkins U.	Feb. 2022
	Local “Local Group” Group - Flatiron Institute	Nov. 2021
	Thunch - Princeton	Sept. 2021
	EAS Annual Meeting	July 2021
	AAS 235 - Dragonfly Telephoto Array Special Session	Jan 2020
Open Source Software & Contributions	<p>Co-Lead Developer - pyseraic </p> <ul style="list-style-type: none"> · Fully Bayesian Sersic fitting implemented in jax <p>Lead Developer - imcascade </p> <ul style="list-style-type: none"> · Flexible method for measuring galaxy morphology based on Mixture of Gaussians <p>Contribution - sbi </p> <ul style="list-style-type: none"> · Added flexibility to memory management, helpful for training large datasets on GPUs <p>Contribution - ArtPop </p> <ul style="list-style-type: none"> · Algorithmic improvements to speed up simulations by $> 4\times$ 	
Observational Experience	<p>JWST - NIRCam</p> <ul style="list-style-type: none"> · Extensive Experience with NIRcam imaging data <p>HST -</p> <ul style="list-style-type: none"> · Extensive experience working with ACS and WFC3 data · PI: <i>Understanding the Role of Massive Stars in Galaxies at Cosmic Noon in a Legacy Spectroscopic Field</i> - Cycle 32 - 11 orbits - \$75k awarded <p>Keck I - LRIS</p> <p style="text-align: right;">Apr. 2021</p> <ul style="list-style-type: none"> · 2 nights observing <p>Dragonfly Telephoto Array</p> <p style="text-align: right;">2020 - 2022</p> <ul style="list-style-type: none"> · Recurring remote observer <p>Keck I - MOSFIRE</p> <p style="text-align: right;">Nov. 2018</p> <ul style="list-style-type: none"> · 3 nights observing <p>Sub-millimetre Array</p> <p style="text-align: right;">July 2016</p> <ul style="list-style-type: none"> · Guest observer for 5 nights 	
Community & Service	<p>Journal Referee</p> <p style="text-align: right;">2022 - Present</p> <ul style="list-style-type: none"> · AAS Journals, JOSS, A&A <p>TAC Reviewer</p> <ul style="list-style-type: none"> · CFHT, Yale Internal <p>Yale Astronomy Student Council – Founding Member</p> <p style="text-align: right;">Fall 2018 - Fall 2021</p> <ul style="list-style-type: none"> · Worked with students to communicate concerns to faculty and improve program <p>CIERA – Observer Group meeting – Co-Organizer</p> <p style="text-align: right;">Fall 2024 - Present</p> <ul style="list-style-type: none"> · Moderated and organized weekly speaker series <p>Yale - Astronomy \times Data Science Journal Club – Organizer</p> <p style="text-align: right;">Fall 2021 - Spring 2023</p> <ul style="list-style-type: none"> · Moderated and organized weekly journal club and speaker series <p>Yale - Galaxy Lunch – Organizer</p> <p style="text-align: right;">Fall 2019 - Fall 2021</p> <ul style="list-style-type: none"> · Moderated and organized weekly journal club and speaker series 	
Outreach	<p>Astronomy Conversations – Adler Planetarium</p> <p style="text-align: right;">Summer 2024 - Present</p> <ul style="list-style-type: none"> · Open discussions with the public on Astronomy and Science in general <p>Astronomy on tap New Haven – Public Talk</p> <p style="text-align: right;">July 2019</p> <ul style="list-style-type: none"> · “The Hubble constant and our expanding universe” <p>Physics Fun and Discovery Days – Presenter</p> <p style="text-align: right;">Summers 2013-2016</p> <ul style="list-style-type: none"> · Performed physics demonstrations to elementary and junior high school students 	

Publications

12 First Author, 38 Co-Authored, [ads library](#)

First Authored

Miller, T. B., Suess, K., Setton, D., et al. 2024 “JWST UNCOVERs the Optical Size - Stellar Mass Relation at $4 < z < 8$: Rapid Growth in the Sizes of Low Mass Galaxies in the First Billion Years of the Universe”, ApJ, submitted, arXiv:2412.06957

Miller, T. B., Pasha, I., Polzin, A., et al. 2024, “Silkscreen: Direct Measurements of Galaxy Distances from Survey Image Cutouts” ApJ, in Review, arXiv:2407.04091.

Pasha, I. & **Miller, T. B.** (Co-lead authors), 2023. “pysersic: A Python package for determining galaxy structural properties via Bayesian inference, accelerated with jax”. JOSS, 8(89), 5703

Miller, T. B., van Dokkum, P., & Mowla, L. 2023, “Color gradients and half-mass radii of galaxies out to $z = 2$ in the CANDELS/3D-HST fields: further evidence for important differences in the evolution of mass-weighted and light-weighted sizes” , ApJ, 945, 2, 155

Miller, T. B., Whitaker, K. E., Nelson, E. J., et al. 2022, “Early JWST imaging reveals strong optical and NIR color gradients in galaxies at $z \sim 2$ driven mostly by dust”, ApJL, 941, 2, L37

Miller, T. B. & van Dokkum, P., 2021, “Bayesian fitting of multi-Gaussian expansion models to galaxy images”, ApJ, 923, 1, 124

Miller, T. B., van Dokkum, P., Danieli, S., et al. 2021, “The Dragonfly Wide Field Survey. II. Accurate Total Luminosities and Colors of Nearby Massive Galaxies and Implications for the Galaxy Stellar Mass Function”, ApJ, 909, 74

Miller, T. B., van den Bosch, F. C., Green, S. B., et al. 2020, “Dynamical self-friction: how mass loss slows you down ”, MNRAS , 495, 4496.

Miller, T. B., Chapman, S., Hayward, C. C., et al., 2020, “Investigating overdensities around $z > 6$ Galaxies through ALMA observations of [CII]”, ApJ , 889, 2

Miller, T. B., van Dokkum, P., Mowla, L. and van der Wel, A. 2019, “A New View of the Size-Mass Distribution of Galaxies: Using r_{20} and r_{80} Instead of r_{50} ”, ApJL, 872, L14

Miller, T. B., Chapman, S. C., Aravena, M., et al., 2018, “A massive core for a cluster of galaxies at a redshift of 4.3” , Nature, 556, 469

Miller, T. B., Hayward, C. C., Chapman, S. C., et al. 2015, “The bias of the submillimetre galaxy population: SMGs are poor tracers of the most-massive structures in the $z \sim 2$ Universe”, MNRAS, 452, 878

Significant Contribution

Treiber, H., Greene, J.,... **Miller, T. B.** ... , et al. 2024, “UNCOVERing the High-Redshift AGN Population Among Extreme UV Line Emitters” arXiv:2409.12232., ApJ Submitted

Benton, C. E., Nelson, E. J., **Miller, T. B.**, et al. 2024, “JWST Reveals Bulge-Dominated Star-forming Galaxies at Cosmic Noon”, arXiv:2409.08328., Accepted ApJ

Weibel, A., de Graaff, A.,... **Miller, T. B.** ... , et al. 2024, “ RUBIES Reveals a Massive Quiescent Galaxy at $z = 7.3$ ”, arXiv:2409.03829, ApJL Submitted

Setton, D. J., Khullar, G., **Miller, T. B.**, et al. 2024, “UNCOVER NIRSpc/PRISM Spectroscopy Unveils Evidence of Early Core Formation in a Massive, Centrally Dusty Quiescent Galaxy at $z_{\text{spec}} = 3.97$ ” , ApJ, 974, 145.

Co-authored

Wang, B., Fujimoto, S., ... **Miller, T. B.** ... , et al. 2023, “UNCOVER: Illuminating the Early Universe – JWST/NIRSpec Confirmation of $z > 12$ Galaxies”, ApJL, 957, L34

Siegel, J., Setton, D., Greene, J.,... **Miller, T. B.** ... et al. 2024, “UNCOVER: Significant Reddening in Cosmic Noon Quiescent Galaxies”, ApJ, submitted, arXiv:2409.11457.

de Graaff, A., Brammer, G.,... **Miller, T. B.** ... et al. 2024, “RUBIES: a complete census of the bright and red distant Universe with JWST/NIRSpec”, A&A Submitted, arXiv:2409.05948,

Price, S. H., Bezanson, R., Labbe, I., ... **Miller, T. B.** ... et al. 2024, “The UNCOVER Survey: First Release of Ultradeep JWST/NIRSpec PRISM spectra for 700 galaxies from z 0.3-13 in Abell 2744 ”, ApJ Submitted , arXiv:2408.03920

Clausen, M., Whitaker, K. E., ... **Miller, T. B.** ... et al. 2024, “ 3D-DASH: The Evolution of Size, Shape, and Intrinsic Scatter in Populations of Young and Old Quiescent Galaxies at $0.5 < z < 3$ ”, ApJ, 971, 99.

Cramer, W. J., Noble, A. G., ... **Miller, T. B.** ... et al. 2024, “Resolved UV and optical color gradients reveal environmental influence on galaxy evolution at redshift $z \sim 1.6$ ” ApJ, Accepted, arXiv:2404.07355.

Suess, K. A., Weaver, J. R., Price, S. H., ... **Miller, T. B.** ... et al. 2024, “Medium Bands, Mega Science: a JWST/NIRCam Medium-Band Imaging Survey of Abell 2744”, arXiv:2404.13132, ApJ Submitted

Kokorev, V., Caputi, K. I., Greene, J. E.,... **Miller, T. B.** ... et al. 2024, “A Census of Photometrically Selected Little Red Dots at $4 < z < 9$ in JWST Blank Fields” ApJ, 968, 38.

Cutler, S. E., Whitaker, K. E., .. **Miller, T. B.** ... , et al. 2024, “Two Distinct Classes of Quiescent Galaxies at Cosmic Noon Revealed by JWST PRIMER and UNCOVER ”, ApJL, 967, L23

Wright, L., Whitaker, K. E., .. **Miller, T. B.** ... , et al. 2024, “Remarkably Compact Quiescent Candidates at $3 < z < 5$ in JWST-CEERS ”, ApJL, 964, L10.

Furtak, L. J., Labbé, I., ... **Miller, T. B.** ... , et al. 2024, “A high black-hole-to-host mass ratio in a lensed AGN in the early Universe”, Nature, 628, 57.

van der Wel, A., Martorano, M., ... **Miller, T. B.** ... et al. 2024, “Stellar Half-Mass Radii of $0.5 < z < 2.3$ Galaxies: Comparison with JWST/NIRCam Half-Light Radii”, ApJ, 960, 53

Price, S. H., Suess, K. A., .. **Miller, T. B.** ... , et al. 2023, “UNCOVER: The rest ultraviolet to near infrared multiwavelength structures and dust distributions of sub-millimeter-detected galaxies in Abell 2744”, arXiv:2310.02500. Submitted to ApJ

Kokorev, V., Fujimoto, S., .. **Miller, T. B.** ... , et al. 2023, “UNCOVER: A NIRSpec Identification of a Broad-line AGN at $z = 8.50$ ”, ApJL, 957, L7.

Martorano, M., van der Wel, A., .. **Miller, T. B.** ... et al. 2023, “ Rest-frame Near-infrared Radial Light Profiles up to $z = 3$ from JWST/NIRCam: Wavelength Dependence of the Sérsic Index” ApJ, 957, 46.

Fujimoto, S., Bezanson, R.,... **Miller, T. B.** ... et al. 2023, “ DUALZ: Deep UNCOVER-ALMA Legacy High-Z Survey”, arXiv:2309.07834. Submitted to ApJS

Greene, J. E., Labbe, I., ... **Miller, T. B.** ... et al. 2023, "UNCOVER spectroscopy confirms a surprising ubiquity of AGN in red galaxies at $z > 5$ " arXiv:2309.05714 , ApJ, 964, 39.

Goulding, A. D., Greene, J. E., ... **Miller, T. B.** ... et al. 2023, "UNCOVER: The Growth of the First Massive Black Holes from JWST/NIRSpec-Spectroscopic Redshift Confirmation of an X-Ray Luminous AGN at $z = 10.1$ ", ApJL, 955, L24.

Baggen, J. F. W., van Dokkum, P., ... **Miller, T. B.** ... et al. 2023, "Sizes and Mass Profiles of Candidate Massive Galaxies Discovered by JWST at $7 < z < 9$: Evidence for Very Early Formation of the Central 100 pc of Present-day Ellipticals", ApJL, 955, L12.

Fujimoto, S., Wang, B., ... **Miller, T. B.** ... et al. 2023, "UNCOVER: A NIRSpec Census of Lensed Galaxies at $z = 8.50 - 13.08$ Probing a High AGN Fraction and Ionized Bubbles in the Shadow" arXiv:2308.11609, submitted to ApJ

Nelson, E. J., Suess, K. A., ... **Miller, T. B.** ... et al. 2023, "JWST reveals a population of ultra-red, flattened disk galaxies at $2 < z < 6$ previously missed by HST", ApJL, 948, L18

Suess, K. A., Bezanson, R., ... **Miller, T. B.** ..., et al. 2022, "Rest-frame near-infrared sizes of galaxies at cosmic noon: objects in JWST's mirror are smaller than they appeared ", ApJL, 937, L33

Lokhorst, D., Abraham, R., ... **Miller, T. B.** ..., et al. 2022, "A Giant Shell of Ionized Gas Discovered near M82 with the Dragonfly Spectral Line Mapper Pathfinder", ApJ, 927, 136.

Pasha, I., Lokhorst, D., ... **Miller, T. B.** ..., et al. 2021, "A Nascent Tidal Dwarf Galaxy Forming within the Northern H I Streamer of M82", ApJL 923

Liu, Q., Abraham, R., ... **Miller, T. B.** ..., et al. 2021, "A Method To Characterize the Wide-Angle Point Spread Function of Astronomical Images", ApJ, 925, 219

Keim, M. A., van Dokkum, P., ... **Miller, T. B.** ... , et al. 2021, "Tidal Distortions in NGC1052-DF2 and NGC1052-DF4: Independent Evidence for a Lack of Dark Matter ", ApJ, 935, 160

Hill, R., Chapman, S. C., ... **Miller, T. B.** ... , et al. 2021, "A census of the stellar content in the protocluster core SPT2349-56 at $z = 4.3$ ", submitted to MNRAS, arXiv:2109.04534

Cunningham, D. J. M., Chapman, S. C. **Miller, T. B.** ... , et al. 2020, The [C II]/[N II] ratio in $3 < z < 6$ sub-millimetre galaxies from the South Pole Telescope survey MNRAS, 494, 4090

Danieli, S., Lokhorst, D., ... **Miller, T. B.** ... , et al. 2020, "The Dragonfly Wide Field Survey. I. Telescope, Survey Design and Data Characterization", ApJ , 894, 119

Ogiya, G., van den Bosch, F. C., ... **Miller, T. B.** ... et al. 2019, "DASH: a library of dynamical subhalo evolution ", MNRAS, 485, 189.

Mowla, L., van der Wel, A., van Dokkum, P. and **Miller, T. B.**, "A Mass-dependent Slope of the Galaxy Size-Mass Relation out to $z \sim 3$: Further Evidence for a Direct Relation between Median Galaxy Size and Median Halo Mass", 2019, ApJL, 872, L13

Marrone, D. P., Spilker, J. S., ... **Miller, T. B.** ... , et al. "Galaxy growth in a massive halo in the first billion years of cosmic history", Nature, 2018, 553, 51

Strandet, M. L., Weiss, A., ... **Miller, T. B.** ... , et al. , "ISM Properties of a Massive Dusty Star-forming Galaxy Discovered at $z \sim 7$ ", ApJL, 2017, 842, L15

Orr, M. E., Hayward, C. C., ... **Miller, T. B.** ... , et al. “Stacked Star Formation Rate Profiles of Bursty Galaxies Exhibit “Coherent” Star Formation”, *ApJL* , 2017, 849, L2