NATALIA C. VILLANUEVA

PhD Student at the University of Texas at Austin
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EDUCATION

University of Texas at Austin, Austin, TX
Ph.D. Astronomy — Fall 2024 —
Advised by Prof. Steven Finkelstein

University of Cambridge, Cambridge, UK
MPhil Physics — Cavendish Laboratory, Kavli Institute for Cosmology — November 2024
Advised by Dr. Sandro Tacchella
The size growth of star formation in the early Universe: Measuring multiwavelength sizes of $z \sim 4-5$ galaxies

Harvard University, Cambridge, MA
A.B. Physics and A.B. Astrophysics, High Honors and cum laude in field; GPA: 3.84 — May 2023
Senior Thesis: Pixel-Scale Hα Mapping of $z \sim 4-5$ Morphologically Complex JWST JADES Galaxies

RESEARCH EXPERIENCE

UT Austin PhD — University of Texas at Austin, Austin, TX
advisor Prof. Steven Finkelstein, Finkelstein High-z Group, CEERS Collaboration, Euclid collaboration, JWST MEOW Collaboration — *August 2024 —*

High-redshift resolved galaxy properties, pixel-scale spectral energy distribution (SED) fitting

Cambridge Master's Thesis — Kavli Institute for Cosmology (KICC), Cambridge, UK
advisor Dr. Sandro Tacchella, Extragalactic Group, JADES Collaboration — *October 2023 - November 2024*

High-redshift galaxy morphology, star formation structure growth of JWST Hα line-emitters

Harvard Bachelor's Thesis — Center for Astrophysics (CfA), Cambridge, Massachusetts
advisors Prof. Daniel Eisenstein & Dr. Benjamin Johnson, JADES Collaboration — *Sep. 2022 - May 2023*

High-redshift galaxy morphology, star formation structure growth of JWST Hα line-emitters

Harvard College Research Program — CfA, Cambridge, Massachusetts
advisors Dr. Sandro Tacchella & Prof. Charlie Conroy — *May 2022 - August 2022*

High-redshift galaxy morphology, empirical modelling of star formation size evolution

Astronomy Junior Thesis — CfA, Cambridge, Massachusetts
advisor Prof. Daniel Eisenstein, DESI Collaboration — *September 2021 - December 2021*

Circumgalactic medium (CGM), quasar-galaxy cross-correlation DESI spectral stacking analysis

Harvard Program for Research in Science and Engineering (PRISE) Fellowship — CfA, Cambridge, Massachusetts
advisor Dr. Sandro Tacchella — *June 2021 - August 2021*

High-redshift galaxy morphology, empirical modelling of star formation size evolution

Maria Mitchell Observatory (MMO) Summer REU Program — Nantucket, Massachusetts
advisor Dr. Suvi Gezari — *May 2020 - August 2020*

Tidal disruption events (TDEs), light curve classification analysis of Zwicky Transient Facility TDE sample

Harvard-Smithsonian Center for Astrophysics (CfA) Cambridge, Massachusetts
advisor Dr. Gonzalo Gonzalez-Abad, MEaSUREs group *June 2019 - August 2019*

Atmospheric science, integrate elevation information to satellite observations of NASA's MEaSUREs program

Astrophysics Laboratory Course Research Project CfA, Cambridge, Massachusetts
advisors Prof. John Kovac & Harvard BICEP team *January 2022 - March 2022*

Instrumentation, optimize BICEP CMB polarization sensitivity with thin vacuum cryostat window

PUBLICATIONS

A. Danhaive, et al. (including **N. Villanueva**) (2026). "Beyond the stars: Linking H sizes, kinematics, and star formation in galaxies at $z \approx 4-6$ with JWST grism surveys and `geko`"

Y. Zhu, et al. (including **N. Villanueva**) (2026). "Clumps in High-redshift Galaxies: Mass Scaling and Radial Trends from JADES"

D. Eisenstein, et al. (including **N. Villanueva**) (2026). "Overview of the JWST Advanced Deep Extragalactic Survey (JADES)"

C. Carreira, et al. (including **N. Villanueva**) (2026). "JWST Advanced Deep Extragalactic Survey (JADES) Data Release 5: Catalogs of inferred morphological properties of galaxies from JWST/NIRCam imaging in GOODS-N and GOODS-S"

B. Robertson, et al. (including **N. Villanueva**) (2026). "JWST Advanced Deep Extragalactic Survey (JADES) Data Release 5: NIRCam Imaging in GOODS-S and GOODS-N"

B. Johnson, et al. (including **N. Villanueva**) (2026). "Overview of the JWST Advanced Deep Extragalactic Survey (JADES)"

A. Danhaive, et al. (including **N. Villanueva**) (2025). "The dawn of disks: unveiling the turbulent ionised gas kinematics of the galaxy population at $z \sim 4-6$ with JWST/NIRCam grism spectroscopy"

P. Iglesias-Navarro, et al. (including **N. Villanueva**) (2025). " Simulation-based inference of galaxy properties from JWST pixels"

S. Tacchella, et al. (including **N. Villanueva**) (2025). "Resolving the nature and putative nebular emission of GS9422: an obscured AGN without exotic stars"

F. D'Eugenio, et al. (including **N. Villanueva**) (2025). "JADES Data Release 3 – NIRSpec/MSA spectroscopy for 4,000 galaxies in the GOODS fields"

C. Simmonds, et al. (including **N. Villanueva**) (2024). "Ionising properties of galaxies in JADES for a stellar mass complete sample: resolving the cosmic ionising photon budget crisis at the Epoch of Reionisation"

A. Bunker, et al. (including **N. Villanueva** (2024). "JADES NIRSpec Initial Data Release for the Hubble Ultra Deep Field: Redshifts and Line Fluxes of Distant Galaxies from the Deepest JWST Cycle 1 NIRSpec Multi-Object Spectroscopy"

M. Rieke, et al. (including **N. Villanueva**) (2023). "JADES Initial Data Release for the Hubble Ultra Deep Field: Revealing the Faint Infrared Sky with Deep JWST NIRCam Imaging"

M. Eiben, et al. (including **N. Villanueva**) (2022). "Laminate polyethylene window development for large aperture millimeter receivers", *SPIE Proceedings*

E. Hammerstein, et al. (including **N. Villanueva**) (2023). "The Final Season Reimagined: 30 Tidal Disruption Events from the ZTF-I Survey"

AWARDS & GRANTS

1. Henry Fellowship, 2023 *(Master's study at University of Cambridge, 1 Harvard student award per year)*
2. Harvard College Research Program (HCRP) Summer Research Grant, 2022
3. Harvard Program for Research in Science and Engineering (PRISE) Fellowship, 2021
4. Massachusetts Space Grant Consortium NASA Space Grant Fellowship, 2020
5. Maria Mitchell Observatory Research Experiences for Undergraduates (REU) Fellowship, 2020
6. Lucy Cavendish College Travel, Research, and Conferences Fund, 2024
7. Lindsey Traub Sports Fund, *Lucy Cavendish College*, 2024

TECHNICAL PRESENTATIONS

Talks:

Beyond Hubble Conference Talk, April 2026. *Size growth of star formation in early galaxies: Larger H-alpha sizes compared to rest-frame UV and optical for z 4-5 JADES JWST galaxies — Cambridge, UK.*

UT Austin Second Year Assessment Talk, April 2026. *The Pixel Frontier: Revealing Hidden Galaxies and Mapping Galaxy Growth — Austin, TX.*

GASPISA2024 Conference Talk, May 2024. *The size growth of star formation in early galaxies: Comparing galaxy sizes across star formation timescales for a large sample of $z \sim 4-5$ galaxies — Pisa, Italy.*

Extragalactic Group meeting, Kavli Institute for Cosmology, April 2024. *Multiwavelength sizes of JADES $z \sim 4-5$ star-forming galaxies — Cambridge, UK.*

Extragalactic Group meeting, Kavli Institute for Cosmology, July 2022. *Empirical model for the size growth of galaxies — Cambridge, UK.*

Astronomy Senior Thesis Presentation, April 2023. *Mapping star formation of morphologically complex $z \sim 4-5$ galaxies* — CfA, *Cambridge, MA.*

Extragalactic Group meeting, Kavli Institute for Cosmology, July 2022. *Empirical model for the size growth of galaxies — Cambridge, UK.*

Astronomy Junior Thesis Presentation, December 2021. *Exploring Circumgalactic Gas: Through spectroscopic cross-correlations of DESI quasar-galaxy pairs* — CfA, *Cambridge, MA.*

MIT PRISM Conference Talk, August 2021. *Growing Galaxies: Modeling the Time and Spatial Evolution of Individual Galaxies* — virtual.

Harvard Program for Research in Science and Engineering (PRISE) Final Talk, August 2021. *From birth to quench: Growing galaxies* — virtual.

Maria Mitchell Observatory Public Research Talk, August 2020. *Exploring the optical emission of tidal disruption events* — virtual.

Poster Presentations:

Cosmic Frontier Center Conference, May 2025. *Decomposing redshifts of overlapping galaxies: Pixel-scale SED fitting with machine learning — Austin, TX.*

AAS 240 Poster Presentation, June 2022. *Empirical Model for the Size Growth of Galaxies — Pasadena, CA.*

AAS 237 Poster Presentation, January 2020. *Systematic Classification of Tidal Disruption Event Light Curves from the Zwicky Transient Facility* — virtual.

CfA SAO/LIP Research Poster Session, August 2019. *Elevation Information for Satellite Observations of Earth's Atmosphere* — CfA, *Cambridge, MA.*

MIT MOSTEC Poster Symposium, August 2018 — MIT, *Cambridge, MA.*

OBSERVING & COLLABORATIONS

JADES JWST GTO Cycle 1 Program (D. Eisenstein PI)

CEERS JWST ERS Cycle 1 Program (S. Finkelstein PI)

MIRAGE JWST GO Cycle 5 Program (S. Finkelstein PI)

OASIS JWST Cycle 3 Program (T. Looser PI)

Euclid Collaboration (Lyman-break galaxy working group)

Hobby Eberly Telescope — *McDonald Observatory, TX*, UT25-3-016: 15 hrs, UT25-2-019: 10 hrs
Spectroscopically confirming Euclid detections of extreme UV-bright galaxies at the Epoch of Reionization

Fred Lawrence Whipple Observatory — *Mt. Hopkins, AZ*
Methods of Observational Astronomy course project (remote observing)
60" Tillinghast refractor telescope (FAST spectrograph instrument), 48" imaging optical telescope

1.2m Millimeter-Wave Telescope — CfA, *Cambridge, MA*
Astrophysics Laboratory course project

WORKSHOPS

Professional Development Program, March/April 2025, March/June 2026
2025 – Teaching development program with outreach at Stanford KIPAC + Friends Community Day
2026 – Project manager for day-long workshop taught at UT Austin Astronomy REU program

XXXV Canary Islands Winter School of Astrophysics, October 2024
Baryon Cycle Across Space and Time

UC Berkeley AstroTech instrumentation Summer School, August 2022
Instrumentation process and design

TEACHING

Teaching Assistant, *AST 376R: Practical Introduction to Research* (taught by Prof. Steven Finkelstein), UT Austin, August-December 2025

Guest lecture, *AST 358: Galaxies and the Universe* (taught by Prof. John Chisholm), UT Austin, April 2025

LEADERSHIP & OUTREACH

Mentorship:

GEVIP research program mentor, *Lauren Kokinakis*, 2024-present

UT Austin NSF REU informal mentor, Summer 2026

UT Austin GUMMY undergrad mentor, 2025-present

Leadership and Service:

Graduate Representative (2026-27)

Graduate Recruitment Officer (2025-26)

Local Organizing Committee, *Raising the Veil on Star Formation Near and Far: A conference in honour of Richard Hills*

Telescope course instructor with STAHR, *Loomis-Michael Observatory at Harvard*

Harvard AstroSoc Board, *Event Coordinator*

Harvard Undergraduate Women in Physics Board

Harvard Society of Physics Students, *Chilloquium and Polaris Peer Mentoring Committees*

Academic Resource Center Peer Tutoring, *Astronomy*

Outreach Events:

STEM Girl Day, UT Austin, February 2026 — **co-leader of Astronomy department outreach efforts**

KIPAC + Friends Community Day, Stanford University, April 2025

STEM Girl Day, UT Austin, February 2025

Outreach Talks:

Maria Mitchell Observatory "Noche Abierta" ("Open Night"), November 2020. *In Spanish.*

Maria Mitchell Observatory "Noche Abierta" ("Open Night"), March 2021. *In Spanish.*

Maria Mitchell Observatory Open Night, March 2021.

Maria Mitchell Observatory Open Night, August 2021. *Loines Observatory, Nantucket, MA.*

Harvard Kirkland Teaches Kirkland, April 2023. *Senior Thesis outreach presentation.*

SKILLS

Programming skills:
Python, DS9, IRAF/PyRAF, Mathematica, Matlab
`Forcepho` morphology-modeling photometry code
`SEDFlow` machine learning spatially-resolved SED fitting code

Technical skills:
LaTeX, LINUX/UNIX, Microsoft Office Suite (Excel, Word, Powerpoint), Adobe Creative Suite

Languages:
English, Spanish (native)