Meredith J. Durbin — Curriculum Vitae

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Education

Ph.D. Astronomy, University of Washington, Seattle, WA, USA 2023
M.S. Astronomy, University of Washington, Seattle, WA, USA 2018
B.A. Physics, Pomona College, Claremont, CA, USA 2014
A.S. Natural Sciences, Santa Rosa Junior College, Santa Rosa, CA, USA 2010

Experience

Postdoctoral Scholar, University of California, Berkeley 2023 - present
Supervisors: Daniel Weisz, Yumi Choi, Alessandro Savino

› Currently investigating systematic differences in timing of cosmic reionization via high-precision star formation histories of long-term Milky Way satellite vs. recently captured ultra-faint dwarf galaxies
› Developed technique for producing time-series photometry for *JWST* imaging data taken outside of time-series observing mode

Graduate Research Assistant, University of Washington 2016 - 2023
Supervisors: Julianne Dalcanton, Benjamin Williams, Rachael Beaton

› Addressed critical systematic uncertainties in the extragalactic distance scale by deriving empirical transformations between ground- and space-based near-infrared filter systems for late-type giant stars using both synthetic and observed photometry
› Produced and released multiwavelength photometry catalogs for high-impact studies in resolved stellar populations and near-field cosmology as part of the large *HST* programs "A Legacy Imaging Survey of M33" (GO-14610, 108 orbits) and "Securing the Absolute Scale for the IR-TRGB Distance Ladder" (GO/PAR-15875, 92 orbit multi-cycle)
› Reassessed the consistency of observed and theoretical calibrations of the tip of the red giant branch (TRGB) with respect to bandpass and stellar properties, and impacts for future extragalactic distance-scale studies
› Evaluated candidate *Roman*/WFI blue filters' relative observational efficiency and sensitivity to stellar population variations in halos

Research and Instrument Analyst, Space Telescope Science Institute 2014 - 2016
Supervisors: Elena Sabbi, Henry Ferguson

› Assessed effects of *HST* WFC3/IR "blob" anomalies on point source photometry, and tested a method to mitigate impacts during calibration
› Constrained possible sources of high-energy "snowball" events in WFC3/IR data by visually inspecting over 7000 candidate events from five years of in-flight data and analyzing their spatial and energetic properties over time
› Evaluated pairwise photometric redshift uncertainties and catalog completeness as a function of exposure depth and galaxy properties for the CANDELS COSMOS survey catalogs
› Core developer on "Quicklook" web application for space telescope data quality monitoring

Undergraduate Research Assistant, Carnegie Observatories 2013 - 2014
Supervisor: Victoria Scowcroft

› Investigated the mid-IR RR Lyrae period-luminosity-metallicity relation in ω Centauri with *Spitzer*/IRAC data

Undergraduate Research Assistant, Pomona College 2012
Supervisor: Alma Zook

› Measured the polarization offset of the Savart plate polarimeter on the Table Mountain Observatory 1-meter telescope with *gri* blazar and standard star polarimetry

Publications

First Author

Durbin, M. J., Beaton, R. L., Monson, A. J., Swidler, B., & Dalcanton, J. J. 2023, "Empirical 2MASS-WFC3/IR Filter Transformations Across the H-R Diagram from Synthetic Photometry", AJ, 166, 236

Williams, B. F., **Durbin, M. J.**, Dalcanton, J. J., Lang, D., Girardi, L., Smercina, A., Dolphin, A., Weisz, D. R., Choi, Y., Bell, E. F., Rosolowsky, E., Skillman, E., Koch, E. W., Lindberg, C. W., Hagen, L., Gordon, K. D., Seth, A., Gilbert, K., Guhathakurta, P., Lauer, T., & Bianchi, L. 2021, "The Panchromatic Hubble Andromeda Treasury: Triangulum Extended Region (PHATTER). I. Ultraviolet to Infrared Photometry of 22 Million Stars in M33", ApJS, 253, 53*
**Williams & Durbin share first authorship; Durbin contributed majority of figures, analysis, and data products*

Durbin, M. J., Beaton, R. L., Dalcanton, J. J., Williams, B. F., & Boyer, M. L. 2020, "MCR-TRGB: A Multiwavelength-covariant, Robust Tip of the Red Giant Branch Measurement Method", ApJ, 898, 57

Coauthor

Chen, Z., Zhang, K., Williams, B. F., & **Durbin, M.** 2024, "A New Cosmic-Ray Rejection Routine for HST WFC3/UVIS via Label-free Training of deepCR", ApJ, 962, 7

Smercina, A., Dalcanton, J. J., Williams, B. F., **Durbin, M. J.**, Lazzarini, M., Bell, E. F., Choi, Y., Dolphin, A., Gilbert, K., Guhathakurta, P., Koch, E. W., Quirk, A. C. N., Rix, H.-W., Rosolowsky, E., Seth, A., Skillman, E., & Weisz, D. R. 2023, "The Panchromatic Hubble Andromeda Treasury: Triangulum Extended Region (PHATTER). V. The Structure of M33 in Resolved Stellar Populations", ApJ, 957, 3

Williams, B. F., **Durbin, M.**, Lang, D., Dalcanton, J. J., Dolphin, A. E., Smercina, A., Yanchulova Merica-Jones, P., Weisz, D. R., Bell, E. F., Gilbert, K. M., Girardi, L., Gordon, K., Guhathakurta, P., Johnson, L. C., Lauer, T. R., Seth, A., & Skillman, E. 2023, "The Panchromatic Hubble Andromeda Treasury. XXI. The Legacy Resolved Stellar Photometry Catalog", ApJS, 268, 48

Lazzarini, M., Hinton, K., Shariat, C., Williams, B. F., Garofali, K., Dalcanton, J. J., **Durbin, M.**, Antoniou, V., Binder, B., Eracleous, M., Vulic, N., Yang, J., Wik, D., Gasca, A., & Kuauhtzin, Q. 2023, "Multiwavelength Characterization of the High-mass X-Ray Binary Population of M33", ApJ, 952, 114

Breuval, L., Riess, A. G., Macri, L. M., Li, S., Yuan, W., Casertano, S., Konchady, T., Trahin, B., **Durbin, M. J.**, & Williams, B. F. 2023, "A 1.3% Distance to M33 from Hubble Space Telescope Cepheid Photometry", ApJ, 951, 118

Koplitz, B., Johnson, J., Williams, B. F., Díaz-Rodríguez, M., Murphy, J. W., Lazzarini, M., Guzman, J., Dalcanton, J. J., Dolphin, A., & **Durbin, M.** 2023, "The Masses of Supernova Remnant Progenitors in M33", ApJ, 949, 32

Johnson, L. C., Wainer, T. M., Torresvillanueva, E. E., Seth, A. C., Williams, B. F., **Durbin, M. J.**, Dalcanton, J. J., Weisz, D. R., Bell, E. F., Guhathakurta, P., Skillman, E., Smercina, A., & Phatter Collaboration. 2022, "The Panchromatic Hubble Andromeda Treasury: Triangulum Extended Region (PHATTER). IV. Star Cluster Catalog", ApJ, 938, 81

Lazzarini, M., Williams, B. F., **Durbin, M. J.**, Dalcanton, J. J., Smercina, A., Bell, E. F., Choi, Y., Dolphin, A., Gilbert, K., Guhathakurta, P., Rosolowsky, E., Skillman, E., Telford, O. G., & Weisz, D. 2022, "The Panchromatic Hubble Andromeda Treasury: Triangulum Extended Region (PHATTER). II. The Spatially Resolved Recent Star Formation History of M33", ApJ, 934, 76

Wainer, T. M., Johnson, L. C., Seth, A. C., Torresvillanueva, E. E., Dalcanton, J. J., **Durbin, M. J.**, Dolphin, A., Weisz, D. R., Williams, B. F., & Phatter Collaboration. 2022, "The Panchromatic Hubble Andromeda Treasury: Triangulum Extended Region (PHATTER). III. The Mass Function of Young Stellar Clusters in M33", ApJ, 928, 15

Gilbert, K. M., Quirk, A. C. N., Guhathakurta, P., Tollerud, E., Wojno, J., Dalcanton, J. J., **Durbin, M. J.**, Seth, A., Williams, B. F., Fung, J. T., Tangirala, P., & Yusufali, I. 2022, "The TREX Survey: Kinematical Complexity Throughout M33's Stellar Disk and Evidence for a Stellar Halo", ApJ, 924, 116

Lazzarini, M., Williams, B. F., **Durbin, M.**, Dalcanton, J., Antoniou, V., Binder, B. A., Eracleous, M., Plucinsky, P. P., Sasaki, M., & Vulic, N. 2021, "Multiwavelength Characterization of the High-mass X-Ray Binary Population of M31", ApJ, 906, 120

Telford, O. G., Dalcanton, J. J., Williams, B. F., Bell, E. F., Dolphin, A. E., **Durbin, M. J.**, & Choi, Y. 2020, "Mass-to-light Ratios of Spatially Resolved Stellar Populations in M31", ApJ, 891, 32

Peters, M., Wisniewski, J. P., Williams, B. F., Lomax, J. R., Choi, Y., **Durbin, M.**, Johnson, L. C., Lewis, A. R., Lutz, J., Sigut, T. A. A., Wallach, A., & Dalcanton, J. J. 2020, "The Hubble Space Telescope Advanced Camera for Surveys Emission Line Survey of Andromeda. I. Classical Be Stars", AJ, 159, 119

Lazzarini, M., Hornschemeier, A. E., Williams, B. F., Wik, D., Vulic, N., Yukita, M., Zezas, A., Lewis, A. R., **Durbin, M.**, Ptak, A., Bodaghee, A., Lehmer, B. D., Antoniou, V., & Maccarone, T. 2018, "Young Accreting Compact Objects in M31: The Combined Power of NuSTAR, Chandra, and Hubble", ApJ, 862, 28

Lotz, J. M., Koekemoer, A., Coe, D., Grogin, N., Capak, P., Mack, J., Anderson, J., Avila, R., Barker, E. A., Borncamp, D., Brammer, G., **Durbin, M.**, Gunning, H., Hilbert, B., Jenkner, H., Khandrika, H., Levay, Z., Lucas, R. A., MacKenty, J., Ogaz, S., Porterfield, B., Reid, N., Robberto, M., Royle, P., Smith, L. J., Storrie-Lombardi, L. J., Sunnquist, B., Surace, J., Taylor, D. C., Williams, R., Bullock, J., Dickinson, M., Finkelstein, S., Natarajan, P., Richard, J., Robertson, B., Tumlinson, J., Zitrin, A., Flanagan, K., Sembach, K., Soifer, B. T., & Mountain, M. 2017, "The Frontier Fields: Survey Design and Initial Results", ApJ, 837, 97

Nayyeri, H., Hemmati, S., Mobasher, B., Ferguson, H. C., Cooray, A., Barro, G., Faber, S. M.,

Dickinson, M., Koekemoer, A. M., Peth, M., Salvato, M., Ashby, M. L. N., Darvish, B., Donley, J., **Durbin, M.**, Finkelstein, S., Fontana, A., Grogin, N. A., Gruetzbauch, R., Huang, K., Khostovan, A. A., Kocevski, D., Kodra, D., Lee, B., Newman, J., Pacifici, C., Pforr, J., Stefanon, M., Wiklind, T., Willner, S. P., Wuyts, S., Castellano, M., Conselice, C., Dolch, T., Dunlop, J. S., Galametz, A., Hathi, N. P., Lucas, R. A., & Yan, H. 2017, "CANDELS Multi-wavelength Catalogs: Source Identification and Photometry in the CANDELS COSMOS Survey Field", ApJS, 228, 7

Beaton, R. L., Freedman, W. L., Madore, B. F., Bono, G., Carlson, E. K., Clementini, G., **Durbin, M. J.**, Garofalo, A., Hatt, D., Jang, I. S., Kollmeier, J. A., Lee, M. G., Monson, A. J., Rich, J. A., Scowcroft, V., Seibert, M., Sturch, L., & Yang, S.-C. 2016, "The Carnegie-Chicago Hubble Program. I. An Independent Approach to the Extragalactic Distance Scale Using Only Population II Distance Indicators", ApJ, 832, 210

Conference Proceedings

Beaton, R. L., Monson, A., Neeley, J., **Durbin, M.**, & Carnegie-Chicago Hubble Program Team. 2021, "Gaia Parallaxes and the ExtraGalactic Distance Scale", in AAS/Division of Dynamical Astronomy Meeting, Vol. 53, AAS/Division of Dynamical Astronomy Meeting, 402.06

Bourque, M., Ogaz, S., Viana, A., **Durbin, M.**, & Grogin, N. 2020, "The Hubble Space Telescope Advanced Camera for Surveys Quick-Look Application", in Astronomical Society of the Pacific Conference Series, Vol. 522, Astronomical Data Analysis Software and Systems XXVII, 355

Bourque, M., Bajaj, V., Bowers, A., Dulude, M., **Durbin, M.**, Gosmeyer, C., Gunning, H., Khandrika, H., Martlin, C., Sunnquist, B., & Viana, A. 2019, "The Hubble Space Telescope Wide Field Camera 3 Quicklook Project", in Astronomical Society of the Pacific Conference Series, Vol. 521, Astronomical Data Analysis Software and Systems XXVI, 495

Bourque, M., Bajaj, V., Bowers, A., Dulude, M., **Durbin, M.**, Gosmeyer, C., Gunning, H., Khandrika, H., Martlin, C., Sunnquist, B., & Viana, A. 2017, "The HST/WFC3 Quicklook Project: A User Interface to Hubble Space Telescope Wide Field Camera 3 Data", in Astroinformatics, Vol. 325, 397–400

Technical Reports

Deustua, S. E., Mack, J., Bowers, A. S., Baggett, S., Bajaj, V., Dahlen, T., **Durbin, M.**, Gosmeyer, C., Gunning, H., Hammer, D., Hartig, G., Khandrika, H., MacKenty, J., Ryan, R., Sabbi, E., & Sosey, M. 2016, "UVIS 2.0 Chip-dependent Inverse Sensitivity Values", Space Telescope Science Institute, Instrument Science Report WFC3 2016-03

Ryan, R. E., J., Deustua, S., Sosey, M., Anderson, J., Baggett, S. M., Bajaj, V., Bourque, M., Bowers, A., Dahlen, T., **Durbin, M.**, Gosmeyer, C., Gunning, H., Khandrika, H., Mack, J., MacKenty, J., Martlin, C., Kozhurina-Platais, V., & Sabbi, E. 2016, "The Updated Calibration Pipeline for WFC3/UVIS: a Reference Guide to calwf3 (version 3.3)", Space Telescope Science Institute, Instrument Science Report WFC3-2016-01

Durbin, M. J., & McCullough, P. R. 2015, "The Impact of Blobs on WFC3/IR Stellar Photometry", Space Telescope Science Institute, Instrument Science Report WFC3 2015-06

Durbin, M. J., Bourque, M., & Baggett, S. 2015, "IR "Snowballs": Long-Term Characterization", Space Telescope Science Institute, Instrument Science Report WFC3 2015-01

Teaching & Mentoring

Research mentor, University of Washington 2022

› Supervised undergraduate student Carter Merrill on project characterizing the impact of differential extinction and varying dust geometries on TRGB detection

Teaching assistant, University of Washington 2016 - 2019

› ASTR 480, "Introduction To Astronomical Data Analysis", Spring 2019
› ASTR 150, "The Planets", Spring 2017
› ASTR 101, "Introduction to Astronomy", Fall 2016 & Winter 2017

Training assistant, Space Telescope Science Institute 2015 - 2016

› Developed and supervised Python training modules for new Instruments Division staff

Teaching assistant, Pomona College 2012 - 2014

› ASTR 051, "Advanced Introductory Astronomy", Spring 2014
› PHYS 042, "General Physics with Laboratory", Fall 2013
› ASTR 009, "Cosmic Origins", Spring 2013
› ASTR 003, "Life in the Universe", Spring 2012

Tutor, Keck Joint Sciences Center 2013

› PHYS 30/31, "General Physics for the Life Sciences", Summer 2013

Accepted Observing Proposals & Grants

Co-I, *A Closer Look at the Formation and Evolution of M31's Inner Disk* 2024
JWST Cycle 3 program GO-4735 (PI Sandford), 23.2 hours

Co-I, *Emission-line stars in the extremely metal-poor dwarf galaxy Sextans A* 2023
HST Cycle 31 program GO-17438 (PI Gull), 8 orbits

Co-I, *The Panchromatic Hubble Andromeda Southern Treasury (PHAST)* 2021
HST Cycle 29 program GO-16778 (PI Williams), 195 orbits

PI, *Modeling Spatiotemporal Systematics in Multiwavelength Stellar Photometry Catalogs* 2021
HST Cycle 29 archival research grant AR-16611, $219,571

PI, *A Fully Self-Consistent Local Group NIR-TRGB Calibration* 2020
HST Cycle 28 archival research grant AR-16122, $137,016

Co-I, *Securing the Absolute Scale for the IR-TRGB Distance Ladder* 2019
HST Multi-Cycle program GO/PAR-15875 (PI Beaton), 92 orbits

Co-I, *Uncovering the Cause of the Shift in Carbon Star Behaviour at High Metallicity* 2019
HST Cycle 27 program GO-15932 (PI Boyer), 33 orbits

Co-I, *Establishing HST's Low Redshift Archive of Interacting Systems* 2018
HST Multi-Cycle program GO/SNAP-15446 (PI Dalcanton), 350 orbits

PI, *Calibrating the Near-Infrared Tip of the Red Giant Branch with Multiwavelength Photometry* 2017
HST Cycle 25 archival research grant AR-15016, $96,020

Presentations

Poster, Improving JWST Data Products Workshop — Nov 2023
"Time Series Analysis for Non-TSO Imaging Data"

Poster, American Astronomical Society #241 401.22 — Jan 2023
"Empirical ground-to-space NIR filter system transformations for cool giants from synthetic photometry"

Seminar talk, University of Chicago Kavli Institute for Cosmological Physics — Apr 2022
"Nailing the Near-IR Tip of the Red Giant Branch with *HST*"

Seminar talk, Princeton University Galread Extragalactic Discussion Group — Jul 2019
"The Stability of the IR-TRGB Using the PHAT Machinery"

NASA Hyperwall presentation, American Astronomical Society Meeting #233 — Jan 2019
"Resolving Triangulum: A Panchromatic *HST* Mosaic of M33"

Poster, Astronomy in the 2020s: Synergies with *WFIRST* — Jun 2017
"Recovering Ages and Metallicities of Stellar Halos with *WFIRST*"

Poster, American Astronomical Society Meeting #227, 147.09 — Jan 2016
"*HST* WFC3/IR Calibration Updates"

Poster, American Astronomical Society Meeting #224, 421.03 — Jun 2014
"The RR Lyrae Period-Luminosity Relation in IRAC Channels 1 and 2"

Service & Outreach

Trivia lead, Astronomy on Tap Seattle — 2021 - 2022

Representative, University of Washington Graduate and Professional Student Senate — 2017 - 2021

Panel support scientist, *HST* Time Allocation Committee, Space Telescope Science Institute — 2015 - 2016

Volunteer, #popscope urban pop-up telescope project, Baltimore chapter — 2015 - 2016

Skills

- **Observing experience:** Hubble Space Telescope; Las Campanas Observatory Magellan/Baade 6.5m; Apache Point Observatory 3.5m; Table Mountain Observatory 1m
- **Programming:**
  - *Advanced:* Python incl. Astropy & affiliated packages, Conda, Dask, Jupyter, Matplotlib, NumPy, Pandas, SciPy, Scikit-learn, Seaborn, Vaex, Xarray
  - *Proficient:* git, HTML/CSS, LaTeX
  - *Basic:* JavaScript, IDL, SQL, Perl, R
- **Astronomy-specific software:** BEAST, DAOPhot, DOLPHOT, Drizzlepac, `hst1pass`, HSTCAL, MATCH, Montage, Source Extractor, STIPS, TRILEGAL
- **Other:** Amazon Web Services, Adobe CreativeSuite, WordPress

References

Dr. Julianne J. Dalcanton
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