DYLAN M. PARÉ

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EDUCATION

University of Iowa, *Iowa City, IA* May 2022
Doctorate of Physics, thesis title: Investigating Properties of Multi-stranded Filament Structures in the Galactic Center
Masters of Astronomy Dec. 2019

University of Massachusetts, Amherst, *Amherst, MA* May 2017
Bachelor of Science, Physics and Astronomy

APPOINTMENTS

Postdoctoral Scholar, *Villanova University, Villanova, PA* August 2022 – Present

RESEARCH SUMMARY

Throughout my career I have investigated the role of magnetic fields in the cosmos. To do so, I have utilized polarimetric radio and far-infrared observations of Galactic and extragalactic sources. These studies have enhanced out understanding of the role of magnetic fields in extragalactic galaxies and in the Galactic Center region of the Milky Way. In addition to my analysis of polarimetric observations, I have implemented advanced modeling techniques like Markov-Chain Monte Carlo fitting to analyze what mechanisms are producing depolarization towards polarized sources.

AWARDS AND HONORS

Cycle 10 ALMA Ambassador, *National Radio Astronomy Observatory* 2023
- A fellowship for $20,000 to educate local astronomers on radio astronomy best-practices and to advertise the ALMA Wideband Sensitivity Upgrade (WSU)
- Taught a one-day workshop for Philladelphia-region astronomers teaching the fundamentals of radio astronomy calibration and imaging.
- Served as the local contact person for astronomers with questions related to radio astronomy observation proposals, data calibration, and imaging.

Faculty Research and Development Grant, *Villanova University* 2022
- Competitive grant awarded based on research success within the Villanova College of Liberal Arts and Sciences.
- Provides funding for conference travel, lab equipment, etc ($4,500 maximum). Was funded to travel to the Winter AAS for January 2023 to present recent results related to radio non-thermal structures in the Galactic Center

Graduate College Post-Comprehensive Research Fellowship, *University of Iowa* 2022
- Awarded for outstanding Graduate student research conducted at the University of Iowa
- Provided a semester of research funding ($11,000) to allow dedicated time to finish my Ph.D. thesis

TELESCOPE PROPOSALS

Accepted Programs as Principle-Investigator:

- *Very Large Array (VLA)*
  - "Exploring the Unique Radio Filaments and the Galactic Center" (195.5 hours, semester 24B)
  - "New Observations of Southern-Latitude Galactic Center Non-Thermal Filaments" (10 hours, semester 20A)
  - "Extended Observation Time of Southern-Latitude Galactic Center Targets" (3.67 hours, semester 20A)
- *Atacama Large Millimeter/sub-millimeter Array (ALMA)*
  - "Unveiling the Nature of the GC Magnetic Field and the Unique Non-thermal Filaments Using ALMA" (17.5 hours, Cycle 10)
  - "The Magnetized Threads of the Galactic Center Radio Arc" (6.6 hours, Cycle 11)
- *Parkes Telescope*
  - "Untangling the Impact of Large-scale Structures Local to the Galactic Center Radio Arc" (50 hours, semester 2022OCTS)
- *Large Millimeter Telescope (LMT)*
  - "TolTEC Observations of the Extreme Star-forming Region Sgr B2" (3.75 hours, semester 2024-S1)

Accepted Programs as Co-Investigator:

- *Atacama Large Millimeter/submillimeter Array (ALMA)*
  - "What drives the mini starburst in Sgr B2?" (15.7, Cycle 11)

PRESENTATIONS

Talks:

- *"The Nature and Role of the Magnetic Field in the Extreme Central Molecular Zone"*
  Stanford KIPAC Tea Talk, August 2024
- *"The Orientation of the Magnetic Field Throughout the CMZ"*
  AAS Meeting 244, press talk, June 2024
- *"The Far-Infrared Polarimetric Large Area CMZ Exploration (FIREPLACE) Survey"*
  ACES Meeting 2024, June 2024
- *"The SOFIA FIREPLACE Survey: 214 μm Polarimetric Observations of the Magnetic Field Throughout the CMZ"*
  AAS Meeting 243, January 2024
- *"Studying the Properties of Newly-Discovered Southern Latitude Non-Thermal Filament Bundles in the Galactic Center"*
  AAS Meeting 241, January 2023
- *"Modeling the Faraday Rotation Encountered Toward the Galactic Center Radio Arc"*
  Royal Astronomical Society Galactic Magnetic Fields Specialist Meeting, October 2021
- *"Exploring the Galactic Center Magnetic Field at High Spatial Resolutions"*
  Our Galactic Ecosystem, February 2022

- *"Investigating Properties of Multi-Stranded Non-Thermal Filaments in the Galactic Center"*
  The Past, Present, and Future of the VLA, August 2021
- *"Modeling the RM Properties of the Galactic Center Radio Arc Using QU-fitting"*
  Square Kilometer Array Science Working Group Plenary Talk, June 2021
- *"Modeling the RM Properties of the Galactic Center Radio Arc Using QU-fitting"*
  Magnetic Fields and the Structure of the Filamentary Medium, June 2021
- *"Polarization and Magnetization Properties of the Galactic Center Radio Arc"*
  AAS Meeting 235, January 2021
- *"Characterizing the Properties of Galactic Center Non-Thermal Filament Systems"*
  GBO Science Lunch Talk, October 2020
- *"Faraday Rotation Measure Synthesis of UGC 10288, NGC 4845, NGC 3044"*
  CHANG-ES 2016 Conference: Radio Halos of Galaxies, July 2016

Posters:

- *"FIREPLACE DR2: Imaging the Entire CMZ"*
  Galactic Center Workshop 2023, April 2023
- *"The Magnetic Field of the Galactic Center Non-thermal Filaments"*
  Galactic Center Workshop 2023, April 2023
- *"The Magnetic Field of the Galactic Center Non-thermal Filaments"*
  ALMA Ambassador Workshop, February 2023
- *"Detailed Polarimetric Analysis of the Galactic Center Radio Arc"*
  AAS Meeting 238, June 2021
- *"A Radio Polarimetric Study of the Galactic Center Radio Arc: Characterizing Rotation Measure and Magnetic Field Distributions"*
  New Horizons in Galactic Center Astronomy and Beyond, October 2019
- *"Analyzing Extragalactic Magnetic Fields Using Faraday Rotation Measure Synthesis"*
  AAS Meeting 229, January 2017

SCIENCE IMPACT

Press Articles About Research

Dazzling New Map Shows How Magnetism Shapes Our Galaxy, Scientific American — July 2024
Mysteries Residing at the Magnetic Heart of the Milky Way, New York Times — April 2024
Latest Map Reveals Complex Magnetic Environment at the Center of the Milky Way, Forbes Japan — April 2024
New Map Reveals Complicated Magnetics of Milky Way's Inner Core, Forbes — March 2024
Scientists Reveal Never-before-seen Map of the Milky Way's Central Engine, Space.com — March 2024

COLLABORATIONS

Commonwealth Scientific and Industrial Research Organisation (CSIRO) — August 2020 – Present
The Probe far-infrared mission for astrophysics (PRIMA)

collaboration January 2022 – Present
ALMA CMZ Exploration Survey Collaboration (ACES) January 2022 – Present
Far-InfraREd Polarimetric Large-Area CMZ Exploration (FIREPLACE) Survey Collaboration August 2022 – Present
Continuum Halos in Nearby Galaxies – an EVLA Survey (CHANG-ES) June 2015 – May 2017

RESEARCH TRIPS

Visiting Scientist at Macquarie University and CSIRO

- Calibrated and imaged Australia Telescope Compact Array data for polarimetric analysis
- Collaborated with colleagues at Macquarie University, CSIRO Marsfield, and CSIRO Perth
- Served as the Duty Astronomer for the Australia Telescope Compact Array to troubleshoot issues that could occur during observing runs on the telescope.

LEADERSHIP, MENTORSHIP, & OUTREACH

Leadership

Villanova Physics Department Colloquium Committee Member *Villanova Physics Department* 2023-Present

- Invited speakers to give talks about their research at a level accessible to undergraduates
- Scheduled talks throughout the academic year to accommodate speaker, department, and university schedules.
- Hosted speakers during their stay by bringing them to faculty offices for 1-on-1 meetings and hosting departmental lunches and dinners

Leadership Team Member *College of Liberal Arts and Sciences Postdoctoral Society (CLASPS), Villanova University* 2023-Present

- Organized professional development programs with the Villanova Institute of Research and Scholarship and Institute for Teaching and Learning focused on crafting cover letters, teaching statements, and other job application materials
- Successfully petitioned Villanova to amend the rules for the Villanova Faculty Research and Development Grant to include all CLAS postdocs and allow postdocs to apply to this grant every academic year (instead of once every two years)
- Organized postdoctoral social events for all CLAS postdocs to facilitate fellowship and networking

Diversity, Equity, & Inclusion Comittee member, *University of Iowa* 2020 – 2022

- Standardized teaching across the department to make introductory courses more accessible

Graduate Student Advisory Committee Member *University of Iowa, Physics* 2021-2022

- Successfully advocated to reformat the physics department qualifying exam to account for graduate students in the different physics and astronomy course tracks
- Successfully petitioned for funds for a first- and second-year graduate student mentorship program within the physics department

Mentorship

First- and Second-Year Graduate Student Mentor *University of Iowa Physics Department* 2021-2022

- Offered advice for transitioning to graduate school, moving to a new area, and maintaining a good work-life balance

- Advised two first-year graduate students and two second-year graduate students on how to balance their time between research, teaching, and course work to graduate efficiently
- Facilitated early-career graduate student community by organizing social events for first and second year graduate student mentees

Research adviser to multiple undergraduates *University of Iowa & Villanova University* 2018 – 2024

Students: Hailey Moore, Genna Crom, Kaitlyn Karpovich, & Mathilda Nillson

- Helped undergraduates read through journal publications and understand the results of scientific articles
- Educated undergraduates on efficient use of python for performing model fits and plotting data arrays
- Assisted students in writing sections of papers based on their contributions to the articles, leading to co-authorship credit for these students

Outreach

Volunteer for Physics & Astronomy Public Observing Nights *University of Iowa, Physics* 2018 – 2022

- Hosted public observing nights where the local community could learn about and observe planets, star systems, and galaxies
- Educated the public about the design of optical telescopes and current topics of active astronomical research such as star formation, the search for life, and cosmology

Villanova Astronomy Green Bank Student Trip Chaperone *Villanova University Astronomy* 2023

- Travelled to the Green Bank Observatory (GB) for astronomy undergraduate weekend trip
- Ensured students attended the GBO informational tours and sessions during the weekend
- Maintained communication with student leaders to ensure all students returned to Villanova campus safely after the weekend

PROFESSIONAL SERVICE

Proposal Review Panel Member

- *National Science Foundation*, Astronomy & Astrophysics Research Grants Galactic Astronomy Galactic Center & Local Universe
- *National Radio Astronomy Observatory*, Interstellar Medium Science Review Panel

Australia Telescope Compact Array Duty Astronomer

- Managed telescope array operations for 1 week every year from 2019 – 2022
- Troubleshooted software and array calibration issues that occurred during observation runs
- Helped array users optimize their observations to ensure that the obtained data had minimal artifacts and could be well-calibrated.

TEACHING EXPERIENCE

Lab Instructor, *Lab Mechanics*, Villanova University Fall 2023

- Led weekly lab sections to reinforce topics taught in lecture
- Reviewed and updated lab manuals in collaboration with other lab instructors to improve clarity and optimize the lab experiments
- Graded weekly lab reports submitted by students

Teaching Assistant, *Stars, Galaxies, and the Universe & Exploration of the Solar System*, University of Iowa 2020 - 2021

- Led multiple lab sections each week introducing students to basic astronomical concepts
- Led evening observation sessions to introduce and familiarize students with what can be observed in the night sky
- Assisted with the Astronomy Help Center to assist students on homework assignments and exam preparation related to introductory astronomy courses

Teaching Assistant, *Exploring the Universe*, University of Massachusetts, Amherst 2016 – 2017

- Assisted the graduate student lab instructor by helping undergraduates progress through lab experiments
- Aided lab students on navigating and troubleshooting the lab software.
- Helped answer student questions related to the lab course.

Dylan M. Paré – Publication List – ORCiD: 0000-0002-5811-0136

PUBLICATIONS

First Author Publications

1. SOFIA/HAWC+ Far-Infrared Polarimetric Large-Area CMZ Exploration Survey. IV. Relative Magnetic Field Orientation Throughout the CMZ
   Paré, D., Chuss, D. T., Karpovich, K. et al. 2025, ApJ, 978, 28

2. A VLA Study of Newly-Discovered Southern Latitude Non-Thermal Filaments in the Galactic Center: Polarimetric and Magnetic Field Properties
   Paré, D., Lang, C. C., Morris, M. R., 2024, ApJ, 974, 200

3. SOFIA/HAWC+ Far-Infrared Polarimetric Large Area CMZ Exploration Survey. III. Full Survey Data Set
   Paré, D., Butterfield, N. O., Chuss, D. T., Guerra, J. A., Iuliano, J. I., Karpovich, K., Morris, M. R., , and Wollack, E. J. 2024, ApJ, 969, 150

4. A Very Large Array Study of Newly Discovered Southern Latitude Nonthermal Filaments in the Galactic Center: Radio Continuum Total-intensity and Spectral Index Properties
   Paré, D., Lang, C. C., Morris, M. T. 2022, ApJ, 941, 123

5. Analyzing the Intrinsic Magnetic Field in the Galactic Center Radio Arc
   Paré, D. M., Purcell, C. R., Lang, C. C., Morris, M. R. 2021, ApJ, 923, 82

6. A VLA Polarimetric Study of the Galactic Center Radio Arc: Characterizing Polarization, Rotation Measure, and Magnetic Field Properties
   Paré, D. M., Lang, C. C., Morris, M. R., Moore, H., Mao, S. A. 2019, ApJ, 884, 170

Co-author Publications

1. SOFIA/HAWC+ Far-infrared Polarimetric Large Area CMZ Exploration Survey. II. Detection of a Magnetized Dust Ring in the Galactic Center
   Butterfield, N. O., Guerra, J. A., Chuss, D. T., Morris, M R., **Paré, D. M.**, Wollack, E. J., Costa, A. H., Hankins, M. J., Mackey, S. C., Staguhn, J. Zweibel, E. 2024, ApJ, 968, 63
   Contribution: Added to the interpretation of the magnetic field orientation observed in the FIREPLACE pilot data.

2. SOFIA/HAWC+ Far-InfraRed Polarimetric Large Area CMZ Exploration Survey. I. General Results from the Pilot Program
   Butterfield, N. O., Chuss, D. T., Guerra, J. A., Morris, M. R., **Paré, D.**, Wollack, E. J., Dowell, C. D., Hankins, M. J., Karpovich, K., Siah, J., Staguhn, J., and Zweibel, E. 2024, ApJ, 963, 130
   Contribution: Provided extensive comments on the magnetic field analysis and interpretation of the studied data set.

3. The JWST Galactic Center Survey – A White Paper
   Schoedel, R., Longmore, S., Henshaw, J., Ginsburg, A., Bally, J., Feldmeier, A, Hosek, M., Nogueras Lara, F., Ciurlo, A., Chevance, M., Kruijssen, J. M., D., Klessen, R., Ponti, G., Amaro-Seoane, P., Anastasopoulou, K., Anderson, J., Arias, M., Barnes, A. T., Battersby, C., Bono, G., Bravo Ferres, L., Bryant, A., Cano Gonzáalez, M., Cassisi, S., Chaves-Velasquez, L., Conte, F., Contreras Ramos, R., Cotera, A., Crowe, S., di Teodoro, E., Do, T., Eisenhauer,

F., Enokiya, R., Fedriani, R., Friske, J. K. S., Gadotti, D., Gallart, C., Gallego Calvente, T., Gallego Cano, E., García Fuentes, P., García Marín, M., Gardini, A., Gautam, A. K., Ghez, A., Gillessen, S., Gouda, N., Gualandris, A., Guarcello, M., Gutermuth, R., Haggard, D., Hankins, M., Hu, Y., Kano, R., Kauffmann, J., Lau, R., Lazarian, A., Libralato, M., Lu, A., Lu, X., Lu, J. R., Luetzgendorf, N., Magorrian, J., Mandel, S., Markoff, S., Martínez Arranz, Á., Mastrobuono-Battisti, A., Melamed, M., Mills, E., Mori, K., Morris, M., Murchikova, E., Nagata, T., Najarro, F., Nandakumar, G., Nataf, D., Neumayer, N., Nishiyama, S., Nobukawa, M., **Paré, D. M.**, Peissker, F., Petkova, M., Pillai, T. G. S., Román, M. R. C., Rugel, M., Ryde, N., Sabha, N., Sánchez Bermúdez, J., Sánchez-Monge, Á., Schultheis, M., Shao, L., Shinnaga, H., Simpson, J., Takekawa, S., Tan, J. C., Thorsbro, B., Torne, P., Goppala Tress, R., Uchiyam, H., Valenti, E., van der Marel, R., Verberne, S., Vermot, P., von Fellenberg, S., Walker, D., Witzel, G., Xu, S., Yano, T., Yusef-Zadeh, F., Zajaček, M., Zoccali, M. 2023, arXiv e-prints, arXiv:2310.11912
Contribution: Contributed to interpretation of star formation within the GC as part of this white paper.

4. CHANG-ES - VIII. Uncovering hidden AGN activity in radio polarization
Irwin, J. A., Schmidt, P., Damas-Segovia, A., Beck, R., English, J., Heald, G., Henriksen, R. N., Krause, M., Li, J., Rand, R. J., Wang, Q. D., Wiegert, T., Kamieneski, P., **Paré, D.**, Sullivan, K. 2017, MNRAS, 464, 1333-1346
Contribution: Conducted tha analysis of the magnetic field derived from radio polarimetric observations of the halos of two edge-on spiral galaxies.

Conference Proceedings:

1. The SOFIA FIREPLACE Survey: 214 μm Polarimetric Observations of the Magnetic Field Throughout the CMZ
Paré, D., Chuss, D., Butterfield, N., Morris, M., Iuliano, J., Karpovich, K., Wollack, E., Zweibel, E., Guerra Aguilera, J., Hankins, M. 2024, American Astronomical Society Meeting Abstracts, 243, 420.01

2. Studying the Properties of Newly-Discovered Southern Latitude Non-Thermal Filament Bundles in the Galactic Center
Paré, D., Lang, C., Morris, M. 2023, American Astronomical Society Meeting Abstracts, 241, 220.03

3. A Radio Polarimetric Study of the Galactic Center Radio Arc: Characterizing Rotation Measure and Magnetic Field Distributions
Paré, D. M., Lang, C. C., Morris, M. R., Moore, H., Mao, S. A. 2021, Astronomical Society of the Pacific Conference Series, 528, 61

4. Detailed Polarimetric Analysis of the Galactic Center Radio Arc
Paré, D. M., Lang, C. C., Purcell, C. R. 2021, American Astronomical Society Meeting Abstracts, 238, 330.07

5. Polarization and Magnetization Properties of the Galactic Center Radio Arc
Paré, D. M., Lang, C., Morris, M., Moore, H., Mao, S. 2020, American Astronomical Society Meeting Abstracts, 235, 310.11

6. Analyzing Extragalactic Magnetic Fields Using Faraday Rotation Measure Synthesis
Paré, D., Wang, Q. D., Kamieneski, P., Sullivan, K. 2017, 229, 304.05

Other Publications:

1. PRIMA General Observer Science Book
   Moullet, A., Kataria, T., Lis, D., Unwin, S., Hasegawa, Y. Mills, E., Battersby, C., Roc, A., Meixner, M., arXiv e-prints, arXiv:2310.20572
   Contribution: Created a science case for the PRIMA science book focused on Galactic Center polarimetry that can be enabled by the advanced capabilities of PRIMA (science casse #59).