MARY GEER DETHERO

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EDUCATION

Georgia State University *Expected May 2025*
PhD in Astronomy

Georgia State University *May 2022*
Master of Science in Physics

Lehigh University *August 2015 - May 2019*
Bachelor of Science, Astrophysics
Minor in Applied Mathematics

RESEARCH EXPERIENCE

Graduate Research Assistant, Georgia State University *July 2019 - present*
Advisor: Jane Pratt
Simulated stellar convection of main sequence, pre-main-sequence, and red giant stars with the hydrodynamic `MUSIC` code. Developed the code to include post-processing scripts to analyze and visualize stellar convection.

NASA Intern, Goddard Space Flight Center *June 2023 - August 2023*
Advisor: Keith Gendreau
Modeled NICER X-ray data analysis for the active binary star system DS Tucanae with a confirmed exoplanet. The analysis includes identifying stellar flares and modeling spectra to determine the energetic strength of the flares. Witnessed risk assessment of repairing damaged spacecraft with EVA due to space debris and adapting craft to continue producing scientific data.

Eckardt Senior Thesis Project, Lehigh University *August 2018 - May 2019*
Advisor: M. Virginia McSwain
Analyzed Gaia data to investigate galactic structure and model the stellar density of the Milky Way galaxy.

Independent Research Project, Lehigh University *January 2018 - May 2018*
Advisor: M. Virginia McSwain
Analyzed Gaia data for massive O stars to investigate the kinematics and rotation curve of the Milky Way Galaxy and behavior of runaway stars.

Summer Intern, National University of Ireland in Galway *June 2017 - July 2017*
Advisor: Matthew Redman
Assisted with the development of computer program PyCross to analyze spectral data from 3-D digital models of nebulae created in the Shape program.

PUBLICATIONS

M. G. Dethero, et al., "The shape of convection in 2D and 3D global simulations of stellar interiors," Astronomy & Astrophysics, Accepted, 14 Sept. 2024. https://arxiv.org/pdf/2409.09815

M. G. Dethero, et al., "Energetic Superflare from a Young Solar Analog, DS Tucanae A, Observed with NICER," Res. Notes AAS 7 203, Sept. 2023.

M. G. Dethero, et al., "NICER X-ray Observations of V1716 Sco," Astronomer's Telegram, No. 16167, 1 Aug 2023.

PRESENTATIONS

M. G. Dethero, J. Pratt, I. Baraffe, "Mass-dependence of convective overshooting in pre-main sequence stars," Cool Stars 22, UC San Diego, San Diego CA, 9 June 2024. Contributed Plenary Talk.

M. G. Dethero, "Overshooting, Filling factors, and plume dynamics with the MUltidimensional Stellar Implicit Code," Challenges and Innovations in Computational Astrophysics V, Virtual, 8 Nov 2023.

M. G. Dethero, "Superflare analysis of DS Tuc," Starganza Stellar Symposium, Georgia State University, Atlanta, GA, 9 Sept 2023.

M. G. Dethero, "Nova V1716 Sco," CRESST II Final Event, Greenbelt, MD, 10 Aug 2023.

M. G. Dethero, "Investigating stellar flares in the young, binary system DS Tuc," Directorate Summer Student Presentation, NASA GSFC, Greenbelt, MD, 4 Aug 2023.

M. G. Dethero,, "Investigating stellar flares in the young, binary system DS Tuc," X-ray Lab Monthly Meeting, NASA GSFC, Greenbelt, MD, 4 Aug 2023.

M. G. Dethero, Emma Charles, Isiah Holt, "NICER Analysis Threads: Challenges and Solutions," NICER Team Tag-Up, NASA GSFC, Greenbelt, MD, 3 Aug 2023.

M. G. Dethero, "Overshooting, filling factors, and plume dynamics: the shape of stellar convection in stars," MUSIC Team Talks, University of Exeter, Virtual, 20 Jan 2023.

Dethero, M. G., Pratt, J., Baraffe, I."Overshooting, plume dynamics, and filling factors: the shape of compressible convection in stars," American Astronomical Society, 241st meeting, Seattle, WA, 9 Jan. 2023.

M. G. Dethero, J. Pratt, "Overshooting, filling factors, and plume dynamics: the shape of compressible convection in the deep interior of stars," Graduate Conference for Research, Scholarship, and Creative Activity, Georgia State University, Atlanta, GA, 11 Nov 2022.

M. G. Dethero,, "Filling Factor in Stellar Convection," MUSIC Team Talks, University of Exeter, Virtual, 27 May 2021.

Dethero, M. G., Pratt, J., Baraffe, I."A comparison of the filling factor in hydrodynamic simulations of pre-main-sequence stars," Cool Stars 20.5, Virtual, 25 Feb. 2021. Poster.

Dethero, M. G., Pratt, J., "A first look at convective overshooting in hydrodynamic simulations of the F-type eclipsing binary BW Aquarii," Royal Astronomical Societys Early Career Poster Exhibition, Virtual, 14-28 Sept. 2020. Poster.

J. Pratt, I. Baraffe, **M. G. Dethero,** K. Gartner, Convective overshooting in hydrodynamic simulations of the F-type eclipsing binary BW Aquarii, American Astronomical Society, 235th meeting, Honolulu, HI, 6 Jan. 2020.

Dethero, M. G., McSwain, M. V., "Investigating Milky Way Structure with Gaia," Eckardt Scholar Senior Thesis Presentation, Bethlehem, PA, 5 May 2019.

Dethero, M. G., McSwain, M. V., "Investigating Milky Way Structure with Gaia," 39th Annual Central Pennsylvania Consortium Astronomers Meeting, Gettysburg, PA, 27 Apr. 2019. Poster.

Dethero, M. G., McSwain, M. V., "Kinematics of the Milky Way Galaxy," Lehigh University Undergraduate Research Symposium, Bethlehem, PA, 3 May 2018. Poster.

TEACHING EXPERIENCE

Lecturer, Georgia State University   *February 2020 -present*
ASTR 8150 - Stellar Structure and Evolution (1 25 minute lecture)
ASTR 1010 - Solar System Astronomy (1 75 minute lecture)
Lab Instructor, Georgia State University   *August 2019 - May 2023*
PHY 1112 - Introductory Physics II (1 section)
ASTR 1020 - Stellar and Galactic Astronomy (6 sections)
ASTR 1010 - Solar System Astronomy (6 sections: 3 in person, 3 online)
Teaching Assistant, Georgia State University   *August 2020 - May 2021*
PHY 3550 - Mathematical Methods and Computational Physics I (1 section, online)
PHY 3560 - Mathematical Methods and Computational Physics II (1 section, online)

SKILLS

Coding Experience:
Python, Fortran, C++, R, Linux, Bash, Emacs, LaTeX.
Astrophysical Codes:
MESA, MUSIC, Rayleigh, ESTER, HEASoft, XSPEC
Summer Schools and Workshops:
NASA Drive Center SHIELD Summer School,
"Plasma Processes at the Edge of our Solar System"   June 9-15, 2024
NASA GSFC Python Bootcamp   June-July,2023
Maria Mitchell Women in Science Symposium   September 22-23, 2022
UKMHD 2021   May 17-23, 2021
Kavli Summer Program in Astrophysics Conference: Fluid of the Sun and Stars   June 6-11, 2021
XSEDE HPC Workshop: MPI   September 1-2, 2020

AWARDS AND HONORS

John Mather Scholar, NASA GSFC and National Space Grant Foundation   *July 2023 - July 2026*

Second Century Initiative Fellow, Georgia State University   *August 2019 - 2023*

Eckardt Scholar, Lehigh University   *August 2015 - May 2019*

Alice P. Gast Women in STEM Scholarship, Lehigh University   *August 2015 - May 2019*

Lehigh Scholar Award, Lehigh University   *August 2015 - May 2019*

SERVICE & OUTREACH TALKS

Astronomy Peer Advising Leaders, Georgia State University   *August 2021 - present*
Co-President   *August 2022 - August 2024*
Mentor   *August 2021 - present*

Computing Committee Graduate Representative   *December 2023 - present*

Galaxies to Gluons Lecture Series, "What do stars look like on the inside?," Georgia State University, Atlanta, GA, 18 July 2024. Talk.

1 Minute Colloquium Participant, Georgia State University   *February 2022, 2023, 2024*

Three Taverns Astronomy Lecture Series, "The inner and outer workings of stars," Three Taverns Brewery, Atlanta, GA, 16 Nov. 2023.

Invited Talk: Gateway to Physics Course, "My journey in astrophysics," Georgia State University, Atlanta, GA, 24 Oct. 2022.

Invited Panelist at REU Program "Surviving Graduate School," Georgia State University, Atlanta, GA, 28 June 2022.

M. G. Dethero, "Stellar Convection," Summer Lunch Talk for Undergraduates, Georgia State University, Virtual, 15 July 2021.