

THOMAS K. WATERS

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EDUCATION

University of Michigan | *PhD, Astronomy & Astrophysics* 2022-Present

- PhD candidate in the Astronomy & Astrophysics program.
- Awarded a Masters of Science degree in Astronomy & Astrophysics following the successful completion of the PhD candidacy exam.

University of Washington | *BS, Comprehensive Physics & Astronomy* 2019-2022

- Cumulative GPA: 3.77; Major GPA: 3.94
- Graduated with honors in the Comprehensive Physics and Astronomy majors.
- Pre-Major in Astronomy Program Member.

South Seattle College | *AS, Physics* 2017-2019

- Cumulative GPA: 4.0
- RST S-STEM Scholarship Recipient.
- Capstone Project: "An Exploration of Black Holes: Calculating the Mass of Sagittarius A*"

RESEARCH EXPERIENCE

Improving Intermediate-Mass Black Hole Demographics Aug 2024 – Present

Advisor: Kayhan Gültekin

(Waters et al. 2026)

- Currently working to improve the demographics and understanding of intermediate-mass black holes (IMBHs) using stellar dynamical mass measurements of 13 galaxies with archival data.
- We seek to refine fundamental galaxy scaling relations for low-mass black holes and enhance our understanding of black hole seeding mechanisms and their role in gravitational wave astronomy.

University of Michigan Pre-Candidate Research Aug 2022 – Aug 2024

Advisor: Kayhan Gültekin

(Waters et al. 2024b)

- Extracted high-resolution line-of-sight velocity dispersion profiles and employed axisymmetric Schwarzschild orbit modeling to constrain galaxy properties.
- Measured the mass of the supermassive black hole in NGC 3258, achieving results consistent with previous Atacama Large Millimeter/submillimeter Array (ALMA) measurements.

Center for Astrophysics, Harvard & Smithsonian Jun 2021 – Jan 2024

Advisor: Razieh Emami

(Waters et al. 2024a)

- Inferred, classified, and analyzed gaseous halo morphologies for Milky Way-like galaxies in the IllustrisTNG TNG50 simulation.
- Discovered a strong correlation between dark matter halo morphologies with warm-hot gas distribution morphologies.

University of Washington Undergraduate Research Sep 2020 – Jun 2022

Advisor: Jessica Werk

- Constrained properties of cold gas within the circumgalactic medium (CGM) using analytic models and observational data.
- Utilized several Python packages in conjunction with Veeper, a curve fitting algorithm, to perform Voigt profile fitting on CGM absorbers.

Advisor: Kishalay De

- Optimized parameters for Source Extractor to detect astronomical sources in Palomar Gattini-IR images, which contain correlated pixel noise.
- Crossmatched resultant Source Extractor catalogs to Two-Micron All Sky Survey to assess performance of parameter sets.

COLLABORATIONS

North American Nanohertz Observatory for Gravitational Waves Dec 2024 – Present

Advisors: Kayhan Gültekin & Luke Zoltan Kelley

- Currently assisting in the development of `holodeck`, a massive black binary population synthesis framework used in the characterization of the recently discovered Gravitational Wave Background.

PUBLICATIONS

"A Supermassive Black Hole Mass Measurement in NGC 5102 with Schwarzschild Orbit-superposition Modeling", **Waters, T. K.**, Gültekin, K., Gebhardt, K., et al. 2026, The Astrophysical Journal, 1007, 63, doi: 10.3847/1538-4357/ae8793

"Understanding Balmer Decrements in T Tauri Stars in Terms of Multiflow Magnetospheric Accretion", Patiño, N., Calvet, N., Magris, G., Micolta, M., Thanathibodee, T.; **Waters, T. K.**, et al. 2026, The Astrophysical Journal, 1002, 190, doi: 10.3847/1538-4357/ae5d2e

"A Stellar Dynamical Mass Measurement of the Supermassive Black Hole in NGC 3258", **Waters, T. K.**, Gültekin, K., Gebhardt, K., et al. 2024, The Astrophysical Journal, 971, 149, doi: 10.3847/1538-4357/ad5a91

"Gas Morphology of Milky Way-like Galaxies in the TNG50 Simulation: Signals of Twisting and Stretching" **Waters, T. K.**, Peterson, C., Emami, R., et al. 2024, The Astrophysical Journal, 961, 193, doi: 10.3847/1538-4357/ad165a

TEACHING EXPERIENCE

Graduate Student Instructor, University of Michigan

ASTRO 461 – Ground-Based Observatories (Intensive)	Spring 2025
ASTRO 361 – Astronomical Techniques	Fall 2024
ASTRO 201 – Introduction to Astrophysics	Winter 2025 – Fall 2025
ASTRO 115 – Introductory Astrobiology	Winter 2024
ASTRO 101 – Introductory Astronomy	Winter 2023 – Fall 2024

OUTREACH ACTIVITIES

Letters to a Pre-Scientist Program	2024–Present
Women+ Excelling More in Math Engineering and the Sciences (FEMMES)	2023–present

PROFESSIONAL DEVELOPMENT

EMIT Summer School in Multimessenger Astronomy	July 2025
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PRIOR WORK EXPERIENCE

United States Marine Corps

June 2013 – May 2017

0311 Infantry Rifleman, Light Armored Reconnaissance Scout.