Keduse Worku

CONTACT INFORMATION William H. Miller III Dept of Physics & Astronomy

Johns Hopkins University Baltimore, MD 21210

EDUCATION Johns Hopkins University

Aug 2022-present

Email: kworku2@jhu.edu

PhD Astrophysics

Advisor: Professor Marc Kamionkowski

Yale University Dec 2021

B.S. Astrophysics

FELLOWSHIPS & AWARDS

| William H. Miller III Fellowship NASA MD Space Grant Consortium Graduate Fellowship 2022-2024 |
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| Yale College Edward A. Bouchet Undergraduate Fellowship Questbridge Scholar 2019-2021 2017-2021 |
| NASA CT Space Grant Consortium Undergraduate Scholarship x2 Chambliss Astronomy Achievement Student Award - Honorable Mention 2020 |
| • National Mentoring Community Conference - 1st Prize Poster Competition 2020 |
| Yale University First-Year Summer Research Fellowship Yale University Arthur L. Shapiro Scholar 2018 |

RESEARCH EXPERIENCE

Johns Hopkins University

Aug 2023-Present

Thesis Work under Professor Marc Kamionkowski

• Modeling imprints of early-universe physics on the 21-cm signature of neutral Hydrogen as a probe of the era of the first stars during the Epoch of Reionization.

Second Year Project under Professor Marc Kamionkowski

- Probing the late-time behavior of relic neutrinos in the non-linear regime through their clustering around dark matter halos.
- Developing computationally-efficient JAX code to rapidly evaluate these neutrino halo profiles, especially regarding the indirect signatures anticipated from upcoming CMB and galaxy survey missions.

First Year Project under Dr. Dan Coe

• Investigating the first galaxies during Epoch of Reionization through gravitationally lensed James Webb Space Telescope (JWST) observations

Princeton University

Jan 2022-Aug 2022

Postbaccalaureate Research under Professor Jo Dunkley

- Analyzed CMB data from the Atacama Cosmology Telescope (ACT) and Planck, constraining Cosmic Infrared Background (CIB) contamination models through cross correlations with the thermal Sunyaev-Zeldovich (tSZ) effect.
- Leveraged 21 cm HI maps to develop a local dust contamination reduction technique, enhancing the accuracy of the analysis.

Flatiron Center for Computational Astrophysics June 2021-August 2021 Summer Project under Professor Jo Dunkley

• Constrained the Dark Energy Equation of State by investigating the Integrated Sachs-Wolfe (ISW) and thermal Sunyaev–Zeldovich (tSZ) effects in the largest galaxy clusters through ACT and Planck cross correlations.

Yale University

June 2018-July 2021

Long-term Project under Professors Greg Laughlin & Songhu Wang

- Performed detailed analysis of photometry & radial velocity data to determine planetary parameters for the hot Jupiter system XO-3b.
- Uncovered promising insights into the formation mechanisms of hot Jupiters through our system's unique orientation.

Harvard-Smithsonian Center for Astrophysics

June 2019-Aug 2019

Summer Project under Dr. Grant Tremblay

- Investigated AGN-driven outflows from galactic centers, shedding light on their influence on host galaxy dynamics.
- Analyzed MUSE data cubes from the VLT to derive stellar kinematics and AGN outflows in merging galaxies.

OUTREACH & PROFESSIONAL SERVICE

Yale University

Jan 2020-May 2021

Undergraduate Affairs Committee Member

 Planned initiatives to integrate undergrads into department through projects such as panels, an online undergraduate wiki, and research facilitation between younger undergrads and faculty

Yale University

Sept 2018-Dec 2019

Planetarium Events Manager

- Coordinated events at Yale Observatory with local elementary and high school groups, different Yale departments, and student assistants
- Assisted with logistical implementation of weekly departmental colloquia

CodeSouth March 2019

Education Nonprofit

• Lead coding workshops in under-resourced Mississippi high school to break down intimidation factor of coding using primarily Python & Scratch

REFEREED PUBLICATIONS Worku, K., Kamiokowski, M., Sabti, N. (2024, in-prep). Relic neutrino overdensities around spherical dark matter halos

Worku, K., Coe, D., Hsaio, T., Resseguier, T., et al. (2024, in-prep). JWST MACS0647 High-z Candidates: Insights into EoR

Worku, K., Wang, S., Burt, J., Rice, M., et al. 2022 (accepted by AJ on Jan 18, 2022). Revisiting the Full Sets of Orbital Parameters for the XO-3 System: No Evidence for Temporal Variation of the Spin-Orbit Angle

Wang, S., Jones, M., Shporer, A., et al. (incl **Worku, K.**) 2019 AJ 157, 2. HD 202772A b: A Transiting Hot Jupiter Around A Bright, Mildly Evolved Star In A Visual Binary Discovered By TESS