Keduse Worku

CONTACT INFORMATION

Bloomberg Center for Physics & Astronomy
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EDUCATION

Johns Hopkins University — Aug 2022-present
PhD Astrophysics
Advisor: Professor Marc Kamionkowski

Yale University — Dec 2021
B.S. Astrophysics

FELLOWSHIPS & AWARDS

- LSSTC Data Science Fellowship — 2023-Present
- William H. Miller III Fellowship — 2022-2024
- NASA MD Space Grant Consortium Graduate Fellowship — 2023
- Yale College Edward A. Bouchet Undergraduate Fellowship — 2019-2021
- Questbridge Scholar — 2017-2021
- NASA CT Space Grant Consortium Undergraduate Scholarship x2 — 2019, 2021
- Chambliss Astronomy Achievement Student Award - Honorable Mention — 2020
- National Mentoring Community Conference - 1st Prize Poster Competition — 2020
- Yale University First-Year Summer Research Fellowship — 2018
- 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., Coe, D., Hsaio, T., Resseguier, T., et al. **(2024, in-prep)**. *JWST MACS0647 High-z Candidates: Insights into EoR*

Worku, K., Sabti, N., Kamiokowski, M. **(2024, submitted to PRD)**. *Rapid Methods for Modeling Overdensities of Massive Neutrinos and Other Non-Cold Relics*

Worku, K., Wang, S., Burt, J., Rice, M., et al. 2022 *AJ* 163, 158. *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*