

CONTACT INFORMATION	Bloomberg Center for Physics & Astronomy Johns Hopkins University Baltimore, MD 21210	Email: kworku2@jhu.edu Website: keduseworku.github.io
EDUCATION	Johns Hopkins University PhD Astrophysics Advisor: Professor Marc Kamionkowski	Aug 2022-present
	Yale University B.S. Astrophysics	Dec 2021
FELLOWSHIPS & AWARDS	<ul style="list-style-type: none"> • MDSGC Observatory Fellowship • LSSTC Data Science Fellowship • William H. Miller III Fellowship • NASA MD Space Grant Consortium Graduate Fellowship • Yale College Edward A. Bouchet Undergraduate Fellowship • Questbridge Scholar • NASA CT Space Grant Consortium Undergraduate Scholarship x2 • Chambliss Astronomy Achievement Student Award - Honorable Mention • National Mentoring Community Conference - 1st Prize Poster Competition • Yale University First-Year Summer Research Fellowship • Yale University Arthur L. Shapiro Scholar 	2025-Present 2023-Present 2022-2024 2023 2019-2021 2017-2021 2019, 2021 2020 2020 2018 2018
RESEARCH EXPERIENCE	Johns Hopkins University Thesis Work under Professor Marc Kamionkowski	Aug 2022-Present
	<ul style="list-style-type: none"> • Modeling imprints of early-universe physics on the 21-cm signature of neutral Hydrogen as a probe of the era of the first stars and galaxies. 	
	Neutrino Clustering Project under Professor Marc Kamionkowski	
	<ul style="list-style-type: none"> • 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 evaluate neutrino halo profiles, with a focus on indirect signatures for upcoming CMB and galaxy surveys. 	
	JWST Project under Dr. Dan Coe	
	<ul style="list-style-type: none"> • Investigating the first galaxies during Epoch of Reionization through gravitationally lensed James Webb Space Telescope (JWST) observations. 	
	Princeton University Postbaccalaureate Research under Professor Jo Dunkley	Jan 2022-Aug 2022
	<ul style="list-style-type: none"> • 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 Summer Project under Professor Jo Dunkley	June 2021-August 2021
	<ul style="list-style-type: none"> • 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. 	

	<p>Yale University June 2018-July 2021 Long-term Project under Professors Greg Laughlin & Songhu Wang</p> <ul style="list-style-type: none"> • 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.
	<p>Harvard-Smithsonian Center for Astrophysics June 2019-Aug 2019 Summer Project under Dr. Grant Tremblay</p> <ul style="list-style-type: none"> • 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	<p>NSBP-JHU Chapter September 2022 - Present Vice President</p> <ul style="list-style-type: none"> • Local chapter of the National Society of Black Physicists (NSBP). • Hosted guest lectures and discussions with prominent Black physicists. • Fostered community among chapter members to support professional development and retention in physics. <p>Yale University Jan 2020-May 2021 Undergraduate Affairs Committee Member</p> <ul style="list-style-type: none"> • Planned initiatives to integrate undergrads into department through projects such as panels, an online undergraduate wiki, and research facilitation between younger undergrads and faculty. <p>Yale University Sept 2018-Dec 2019 Planetarium Events Manager</p> <ul style="list-style-type: none"> • 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. <p>CodeSouth March 2019 Education Nonprofit</p> <ul style="list-style-type: none"> • Lead coding workshops in under-resourced Mississippi high school to break down intimidation factor of coding using primarily Python & Scratch.
REFEREED PUBLICATIONS	<p>Worku, K., Coe, D., Hsaio, T., Resseguier, T., et al. (2024, in-prep). <i>JWST MACS0647 High-z Candidates: Insights into EoR</i></p> <p>Worku, K., Sabti, N., Kamiokowski, M. (2024, submitted to PRD). <i>Rapid Methods for Modeling Overdensities of Massive Neutrinos and Other Non-Cold Relics</i></p> <p>Worku, K., Wang, S., Burt, J., Rice, M., et al. 2022 <i>AJ</i> 163, 158. <i>Revisiting the Full Sets of Orbital Parameters for the XO-3 System: No Evidence for Temporal Variation of the Spin-Orbit Angle</i></p> <p>Wang, S., Jones, M., Shporer, A., et al. (incl Worku, K.), 2019 <i>AJ</i> 157, 2. <i>HD 202772A b: A Transiting Hot Jupiter Around A Bright, Mildly Evolved Star In A Visual Binary Discovered By TESS</i></p>