



# <u>Abstract</u>

This research presents a detailed investigation into exoplanet transit observations conducted through the Pan-African Citizen Science e-Lab (PACS e-Lab). Utilizing the MicroObservatory, a network of small robotic telescopes operated by the Harvard-Smithsonian Center for Astrophysics, to conduct exoplanet observations. This study employs the Exoplanet Transit Interpretation Code (EXOTIC) to perform photometry and refine the orbital parameters of exoplanets, notably WASP-43b. The resulting data contributes to the scientific community's understanding of exoplanet characteristics and aids in the preparatory work for upcoming missions such as the James Webb Space Telescope (JWST) and the Nancy Grace Roman Space Telescope.

## **Introduction**

This study focuses on the transit photometry of exoplanets, with initial observations targeting WASP-43b, a gas giant orbiting a K-type star (WASP-43) with a mass of 1.78 Jupiters, an orbital period of 0.8 days, and a separation of 0.0142 AU. On February 4, 2025, observations were scheduled via the DIY Planet Search portal, resulting in a dataset of 59 images and 2 dark frames acquired from the MicroObservatory Image Directory. This dataset served as the basis for subsequent photometric analysis using EXOTIC.



0.15m telescope located on the MicroObservatory Image Directory site

# <u>Methodology</u>

### **Data Collection:**

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- Employed the MicroObservatory to capture exoplanet transit data.
- Acquired image datasets from the MicroObservatory Image Directory.

### **Photometric Analysis:**

- Processed the dataset using EXOTIC to generate a light curve by comparing the target exoplanet (WASP-43b) with four nearby comparison stars.

# **Exoplanet Transit Observations and Photometric Analysis.**

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Image of the WASP-43b exoplanet photometry on EXOTIC



## **Results/Conclusion**

The photometric analysis yielded a precise light curve for WASP-43b, leading to refined orbital parameters. This methodology has been successfully applied to additional exoplanets, including HATP-20b, WASP-12b, WASP-10b, TrES-3b, and Qatar 2b, demonstrating the robustness of this citizen science approach in exoplanet research. The refined data is essential for ongoing exoplanet studies and aids in planning for future space missions.



#### **References**

MicroObservatory: exoplanet-watch/overview/

### **Contacts**

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American Association of Variable Star Observers (AAVSO): <u>https://www.aavso.org/</u>

https://waps.cfa.harvard.edu/microobservatory/MOImageDirectory/ImageDirectory.ph p?SortBy=Date&SortPos=ASC&SearchFor=&Type=Object&SortRange=10

NASA Exoplanet Watch: <u>https://exoplanets.nasa.gov/exoplanet-watch/about-</u>

Pan-African Citizen Science e-Lab: https://pacselab.space/