

Assessing Ariel's Potential for Low-Density Exoplanet Characterization Achrène Dyrek (STScI)

Low-density exoplanets ($\rho < 0.7 \text{ g cm}^{-3}$) display a wide range of atmospheric and interior properties that remain difficult to interpret and have no Solar System counterparts. Recent JWST observations, such as of the benchmark warm Neptune WASP-107b, provide the first detailed insights into this population, revealing variations in atmospheric composition, cloud structure, and intrinsic temperature. These early results motivate a broader, population-level assessment of what can be learned about low-density planets with future observations.

We compile the current sample of low-density planets observed with JWST and examine emerging trends in their atmospheric and thermal properties. Using this as a baseline, we generate simulated Ariel spectra for representative targets to evaluate the mission's ability to recover key atmospheric constraints.

This study provides a consolidated view of the low-density planets most suitable for Ariel and outlines how the mission can contribute to comparative analyses across this diverse class of worlds.