The James Webb Space Telescope: Capabilities for Transiting Exoplanet Observations

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Abstract

The James Webb Space Telescope (JWST) is a large aperture, infrared telescope planned for launch in 2018. JWST is a facility observatory that will address a broad range of science goals covering four major themes: First light and Re-Ionization, the Assembly of Galaxies, the Birth of Stars and Protoplanetary Systems, and Planetary Systems and the Origins of Life. With a 6.5 meter diameter mirror it will be the largest space telescope ever flown, and is the first cryogenic telescope to incorporate passive cooling, achieved by means of a large sunshade, to reach its _˜40 K operating temperature. I will present an overview of the observatory design, highlighting recent progress towards integration and testing. In the context of testing, I will discuss the predicted performance of the observatory, including image quality, stray light and stability. JWST offers a wide range of instrumental capabilities for observations of transiting exoplanets. I will summarize these capabilities, including wavelength coverage, bright limits, instrumental strengths (which mode to use) and show simulated performance. A key issue that bears upon transiting exoplanet observations are operational constraints. I will review JWST's operational constraints and the role they play in designing transit observation programs such as full phase curve spectroscopy. Finally, I will address the planned deployment and commissioning activities for the observatory, including observations designed to baseline the performance of exoplanet observational capabilities.

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