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Characterization of exoplanets with the JWST

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The James Webb Space Telescope is revolutionizing our understanding of exoplanetary systems. Its mid-infrared instrument, MIRI, opens a completely new observational window, providing unprecedented sensitivity in a wavelength regime previously inaccessible. MIRI first observed some of the most iconic exoplanetary systems, obtaining deep coronagraphic images in three filters spanning 10 to 15 microns. All the known planets in the targeted systems are clearly detected. This has allowed, for the first time, direct measurements of their mid-infrared fluxes. The results suggest that these planets are larger and cooler than earlier near-infrared estimates implied, aligning more closely with theoretical evolutionary models. The observations also delivered the first spatially resolved view of the warm inner debris disks of these systems, structures analogous to the asteroid belt in our own solar system. MIRI is also equipped with a medium-resolution spectrometer that delivers spectro-imaging across the 5–28 micron range. This instrument enables the first mid-infrared spectra of exoplanets, revealing the presence of carbon-rich circumplanetary disks. By developing high-contrast imaging methods for spectroscopic data, we can now detect and measure new key molecular features in exoplanet atmospheres. Determining these molecular abundances is key to unraveling how planets form, how they evolve, and what physical and chemical processes shape them into the worlds we observe today. I'll be presenting GTO results from the ExoMIRI and Telescope Science Team, together with ongoing works from several programs.