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Characterization of Exoplanets Using Transits and Secondary Eclipses

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The passage of a planet in front of its parent star provides an optimal situation for inference of the physical properties of the planet. Masses and radii derived for transiting planets allow us to deduce their bulk composition. As the planet passes behind the star during secondary eclipse, the thermal emission spectrum of the planet can be measured. The Spitzer Space Telescope has measured both transits and eclipses of numerous transiting planets, and Spitzer's capability for thermal emission measurements extends down to close-in super-Earths in favorable cases. Following the loss of cryogen in early 2009, Warm Spitzer will remain capable of several important exoplanet transit measurements, including precise timing of giant planet transits to infer the presence of unseen lower mass planets. The advent of the James Webb Space Telescope (2013) will extend the capability to measure thermal emission using the transit technique down to Earth-like planets orbiting lower main sequence stars.