

Optimized instrumentation for Exoplanet Characterization

Pieter Deroo, NASA Jet Propulsion Laboratory

Exoplanet combined light spectroscopy has emerged as the most powerful tool for characterizing the atmospheric composition and conditions of the already discovered transiting exoplanet systems. This has led to the development of multiple small to medium scale observatory concepts, including EChO, to start the process of studying the statistics of atmosphere characteristics. To design such instruments, a new way of thinking has to be developed because none of the typical astronomical paradigms is applicable. We will present one such method that is based on the ability to measure the composition and longitudinal temperature profile of the known exoplanets. We explore three major design elements : telescope collecting area, photometric stability and wavelength coverage. Our analysis demonstrates that a modest, 1-meter class observatory, using simple photometric optimization design elements, will provide an exponential jump in knowledge on exoplanet atmospheres. Exoplanet characterization thus breaks the typical bigger-better paradigm by offering significant performance for a small payload.