

Characterizing Other Earths: Why and How

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The past few years have seen dramatic progress in studies of extrasolar planets, driven by technological advances that push detection limits and broaden the suite of tools at our disposal. Several techniques have been proposed for the detection of habitable planets around nearby Solar-type stars: transit photometry and spectroscopy, direct imaging, nulling interferometry and astrometry. They all require substantial further technology development and large investments in (mostly space-based) facilities. Therefore one has to ask the question how these different approaches compare to each other, what kind of planets each one can detect, and what information can be obtained from them. If one is interested in complicated issues like the potential habitability of a planet (or even the actual presence of life on it), a single technique can hardly provide conclusive answers. One needs to consider orbit, mass, age, surface and atmospheric properties of the planet; all of these are directly related to the host star. Therefore results from different techniques have to be combined intelligently to form a comprehensive picture, and to exclude misinterpretations of limited data sets. I will discuss how various observing techniques can help characterize other Earths, and how they can complement each other.