Geophysical Research Abstracts
Vol. 16, EGU2014-1396, 2014
EGU General Assembly 2014

NASA's Missions for Exoplanet Exploration

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Exoplanets are detected and characterized using a range of observational techniques – including direct imaging, astrometry, transits, microlensing, and radial velocities. Each technique illuminates a different aspect of exoplanet properties and statistics. This diversity of approach has contributed to the rapid growth of the field into a major research area in only two decades. In parallel with exoplanet observations, major efforts are now underway to interpret the physical and atmospheric properties of exoplanets for which spectroscopy is now possible. In addition, comparative planetology probes questions of interest to both exoplanets and solar system studies. In this talk I describe NASA's activities in exoplanet research, and discuss plans for near-future missions that have reflected-light spectroscopy as a key goal. The WFIRST-AFTA concept currently under active study includes a major microlensing survey, and now includes a visible light coronagraph for exoplanet spectroscopy and debris disk imaging. Two NASA-selected community-led teams are studying probe-scale (< $1B) mission concepts for imaging and spectroscopy. These concepts complement existing NASA missions that do exoplanet science (such as transit spectroscopy and debris disk imaging with HST and Spitzer) or are under development (survey of nearby transiting exoplanets with TESS, and followup of the most important targets with transit spectroscopy on JWST), and build on the work of ground-based instruments such as LBTI and observing with HIRES on Keck.

This research was carried out at the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration. Copyright 2014. California Institute of Technology. Government sponsorship acknowledged.