Exo-C: A Design Study of a Probe-scale Space Mission to Directly Image and Spectroscopically Characterize Exoplanetary Systems using an Internal Coronagraph

Science and Technology Definition Team: K. Stapelfeldt & M. McElwain (NASA/GSFC); R. Belikov & M. Marley (NASA/Ames); K. Cahoy (MIT); S. Chakrabarti (UMass Lowell); V. Meadows (U. Washington); G. Bryden, E. Serabyn & J. Trauger (JPL/Caltech)


Concept Study of a Kepler-like mission for exoplanet direct imaging; < $1 B backup plan to AFTA/WFIRST mission.

Design study started spring 2013, completes Jan 2015. Interim report now available. Key parameters:

- Technical readiness for FY 17 start, 2024 launch
- Stable Earth-trailing orbit
- 1.5m unobscured telescope
- Coronagraph: Hybrid Lyot baseline; PIAA-CMC and Vector vortex options
- 2λ/D inner working angle
- Active wavefront control with two 48x48 deformable mirrors, 0.4-1.0 μm imaging and R= 70 spectroscopy

Bright science target star provides reference for precision pointing and compensation of low-order wavefront drifts

Above: Known RV planets (points) and HZs accessible to Exo-C

Color codes for contrast difficulty.

Below: Exo-C imaging search space for planets of nearby stars, as a function of planet size and orbit

Interim Report
http://exep.jpl.nasa.gov/stdt/exoc