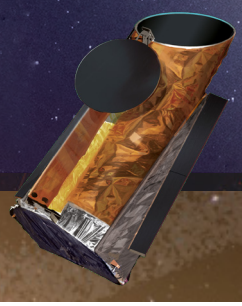
HabEx

HABITABLE EXOPLANET OBSERVATORY



EXPLORING PLANETARY SYSTEMS *AROUND NEARBY SUNLIKE STARS AND ENABLING OBSERVATORY SCIENCE FROM THE UV THROUGH NEAR-IR*

GOAL 1

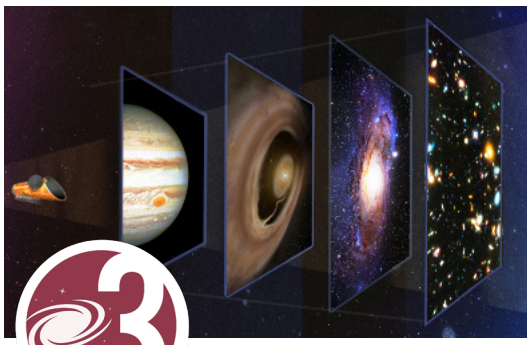
To seek out nearby worlds and explore their habitability,

HabEx will search for Habitable Zone Earth-like planets around sunlike stars using direct imaging and will spectrally characterize promising candidates for signs of habitability and life.

GOAL 2

To map out nearby planetary systems and understand the diversity of the worlds they contain,

HabEx will take the first "family portraits" of nearby planetary systems, detecting and characterizing both inner and outer planets, as well as searching for dust and debris disks.

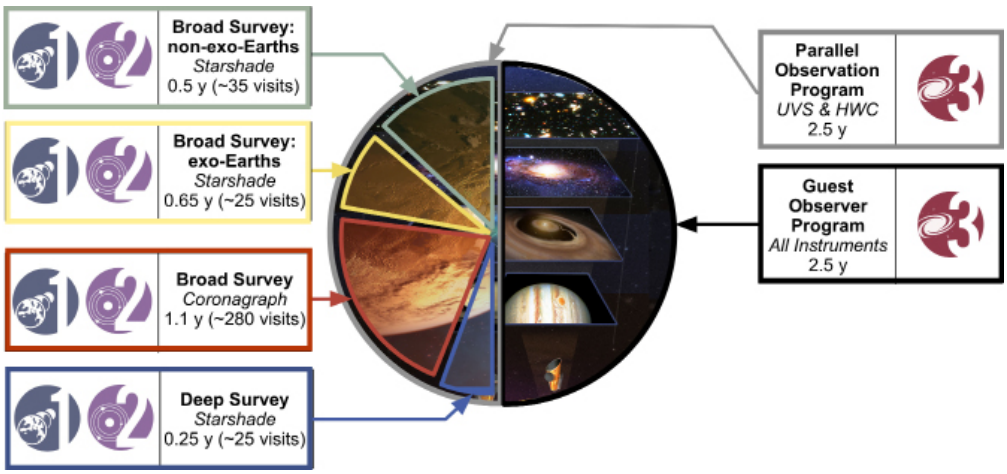


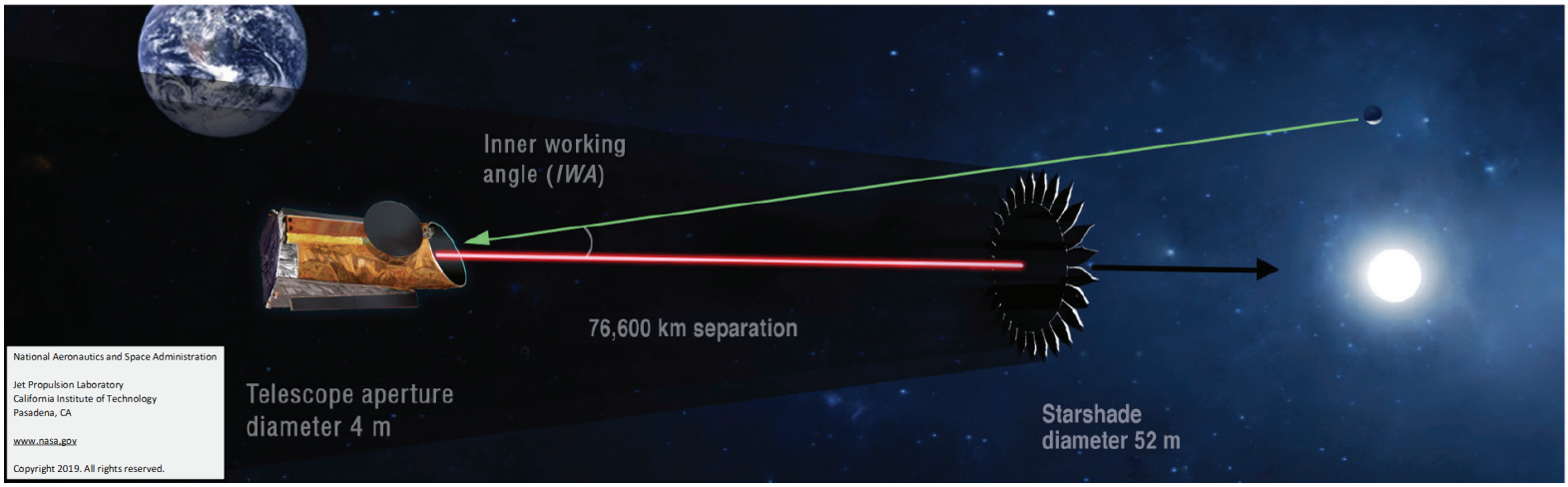
GOAL 3

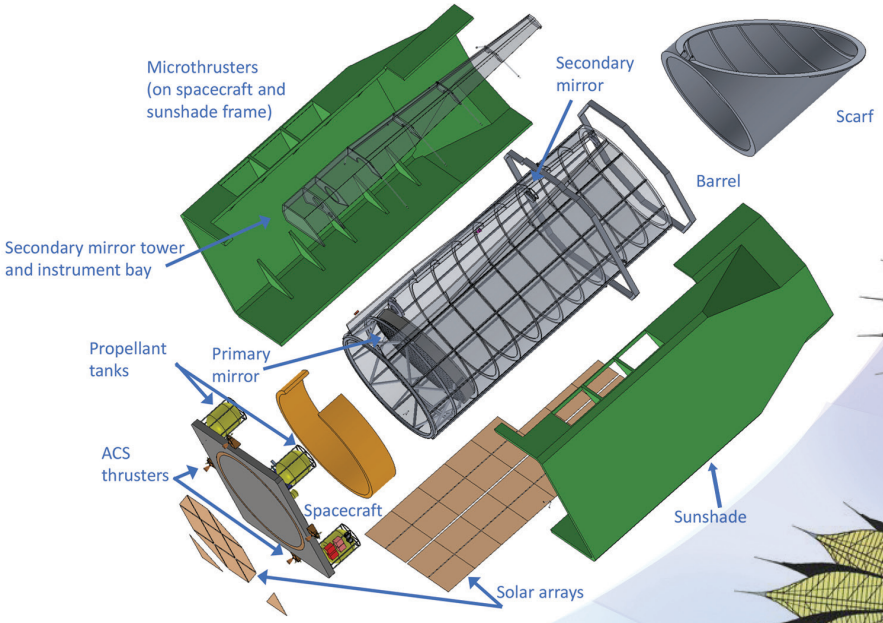
To enable new explorations of astrophysical systems from our solar system to galaxies and the universe by extending our reach in the UV through near-IR,

HabEx will have a community-driven Guest Observer program to undertake revolutionary science with a large-aperature, ultra-stable UV through near-IR space telescope.

HabEx is an observatory for the greater astrophysics community, balancing exoplanet and general astrophysics observing programs. ***HabEx*** is also capable of parallel deep field observations with general astrophysics instruments during exoplanet observation.

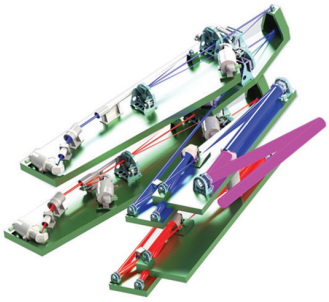


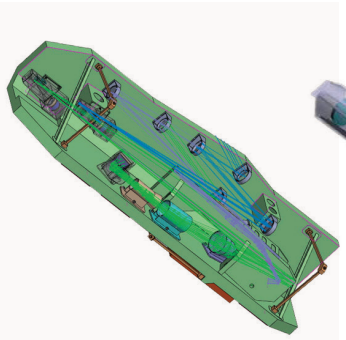


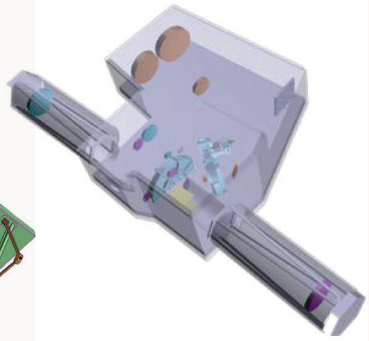


Starshade deployment steps

	HABITABLE EXOPLANET OBSERVATORY
Mission Duration	5 years (10 years consumables)
Orbit	Earth-Sun L2 Halo
Telescope Aperture	4-meter unobscured
Telescope Type	Off-axis three-mirror anastigmat
Primary Mirror	4-meter monolith; glass-ceramic substrate; Al+MgF2 coating
Instruments (4)	Exoplanet science: Coronagraph, Starshade Observatory science: UV Spectrograph, Workhorse Camera
Attitude Control	Slewing: hydrazine thrusters; Pointing: microthrusters







	Coronagraph	Starshade	Workhorse Camera	UV Spectrograph
Purpose	Exoplanet imaging and characterization	Exoplanet imaging and characterization	Multipurpose, wide-field imaging camera and spectrograph for observatory science	High-resolution, UV imaging and spectroscopy for observatory science
Instrument Type	Vector Vortex charge 6 coronagraph with: - Raw contrast: 2.5 x 10^{-10} at IWA - Δmag limit = 26.0 - 20% instantaneous bandwidth Imager and spectrograph	52 m dia starshade occulter with: - 76,600 km separation (Vis) - Raw contrast: 1×10^{-10} at IWA - Δmag limit = 26.0 - 108% instantaneous bandwidth Imager and spectrograph	Imager and spectrograph	High-resolution imager and spectrograph
Channels	Visible: 450–975 nm Imager + IFS with R = 140 Near-IR: 975-1800 nm Imager + IFS with R = 40	UV: 200–450 nm Imager + grism with R = 7 Vis: 450–975 nm Imager + IFS with R = 140 Near-IR: 975–1800 nm Imager + IFS with R = 40	Vis: 370–975 nm Imager + grism with R = 1,000 NIR: 975–1800 nm Imager + grism with R = 1,000	UV: 115-320 nm (20 bands), R = 60,000; 25,000; 12,000; 6,000; 3,000; 1,000; 500; 1.
Field of View	FOV: 1.5 x 1.5 arcsec^2 @ 0.5 μm IWA: 2.4 λ/D = 62 mas @ 0.5 μm OWA: 32 λ/D 830 mas @ 0.5 μm	FOV: 12 x 12 arcsec^2 (Vis) IWA: 70 mas (0.3-1.0 μm) OWA: 6 arcsec (Vis)	3×3 arcmin^2	3×3 arcmin^2
Features	64x64 deformable mirrors (2) Low-order wavefront sending & control	Formation flying sensing & control	Microshutter array for multi-object spectroscopy 2×2 array, 171×365 apertures	Microshutter array for multi-object spectroscopy 2×2 array, 171×365 apertures