

Jet Propulsion Laboratory
California Institute of Technology

**EXOPLANET EXPLORATION PROGRAM
EVENING SESSION
National Harbor, MD**

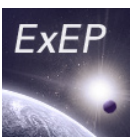
**Exoplanet Exploration Program
Welcome / Overview**

Gary Blackwood, Exoplanet Exploration Program Manager
Jet Propulsion Laboratory, California Institute of Technology

January 7, 2014

The Exoplanet Exploration Program

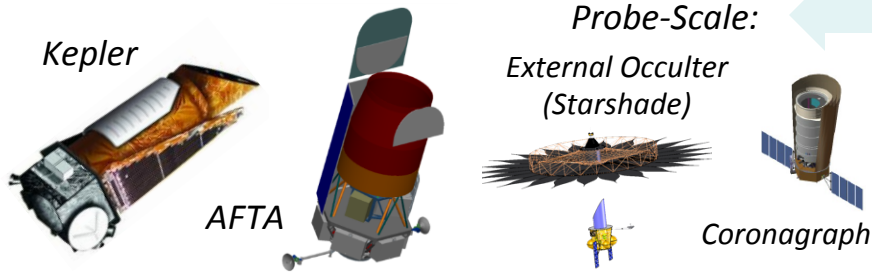
NASA Astrophysics Division, Science Mission Directorate



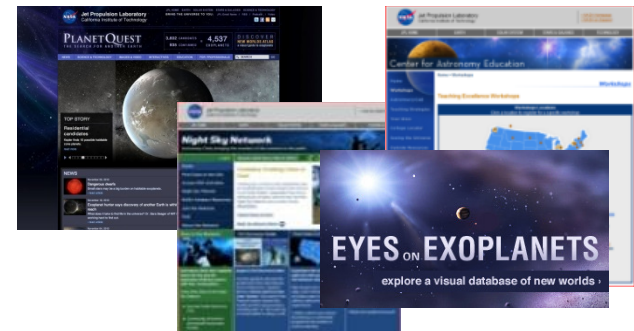
ExoPlanet Exploration Program

Exploring How the Universe Works
Discovering and Characterizing Exoplanets
Searching for Signs of Life in the Galaxy

Space Missions and Mission Studies



Public Engagement

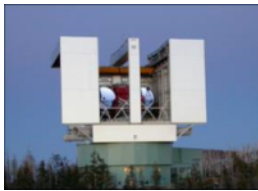


Supporting Research & Technology

Key Sustaining Research



Keck Single Aperture
Imaging and RV



Large Binocular
Telescope Interferometer

Technology Development



High Contrast
Imaging



Deployable
Star Shades

Archives, Tools & Professional Education



NASA Exoplanet Science Institute

Exoplanet Exploration: A Decade Horizon

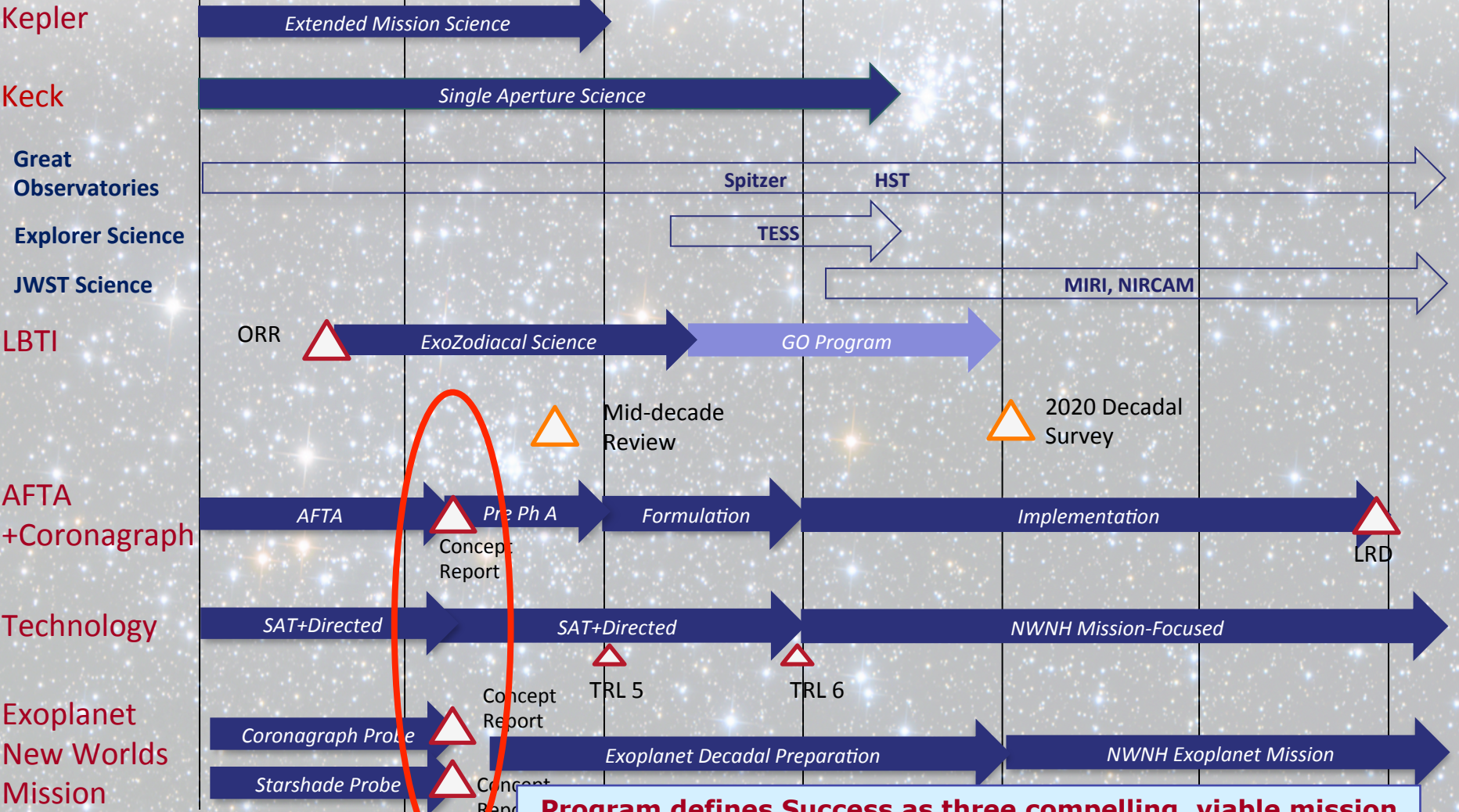
NASA-sponsored efforts



ExoPlanet Exploration Program

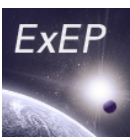
Fiscal Year

2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024



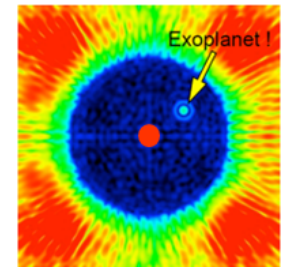
Program defines Success as three compelling, viable mission concept reports by 1/31/15 with CATE by 2/28/15

WFIRST/AFTA: Coronagraph Architectures Selected for Further Development



ExoPlanet Exploration Program

- SDT Report (April 2013) described science possible with 2.4m telescope including
 - Dark energy, infrared survey, microlensing
 - Exoplanet direct imaging via coronagraph
- AFTA Coronagraph Working Group formed
- Architectures selected for continued study and technology investment:
 - Primary: **Occulting Mask Coronagraph (OMC)**, single optical design incorporating both Hybrid Lyot (**HL**) and Shaped Pupil (**SP**) masks
 - Backup: **Phase Induced Amplitude Apodization Complex Mask Coronagraph (PIAA-CMC)**
 - More about this: <http://exep.jpl.nasa.gov>
- Technology plan for potential FY17 new mission start



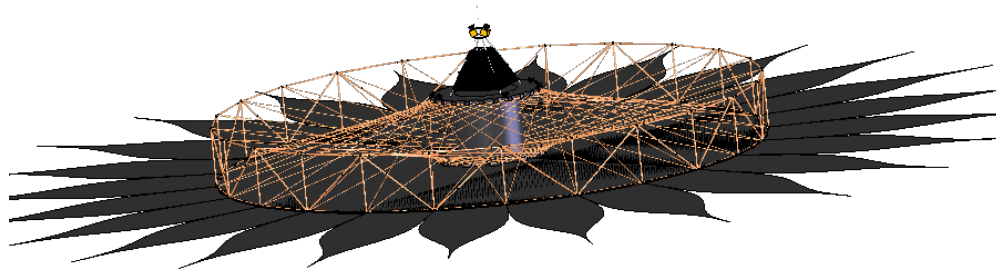
AFTA Coronagraph Working Group



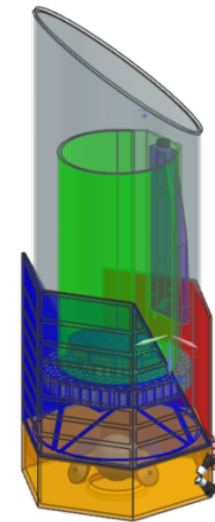
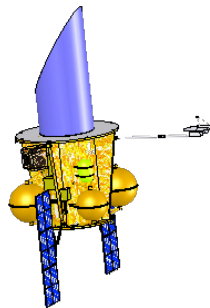
<p>SPC</p> <p>Pupil Masking (Kasdin, Princeton University)</p>	<p>HLC</p> <p>Image Plane Amplitude & Phase Mask (Trauger, JPL)</p>	<p>PIAACMC</p> <p>Pupil Mapping (Guyon, Univ. Arizona)</p>
<p>VVC</p> <p>Image Plane Phase Mask (Serabyn, JPL)</p>	<p>VNC(2) - DAVINCI</p> <p>Visible Nuller - DAVINCI (Shao, JPL)</p>	<p>VNC-PO</p> <p>Visible Nuller - Phase Occulting (Clampin, NASA GSFC)</p>

Probe-Scale Missions

- Two probe-scale (\$1B) mission concepts under development by Science and Technology Definition Teams (STDTs)
 - Exo-S (Starshade, or External Occulter) Sara Seager, MIT, chair
 - Exo-C (Coronagraph) Karl Stapelfeldt, GSFC, chair
- Purposes: Alternatives for FY17 new mission start, motivate technology investments, potential candidates for 2020 Decadal



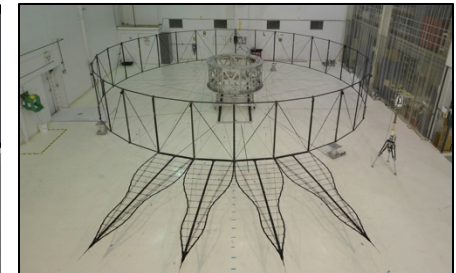
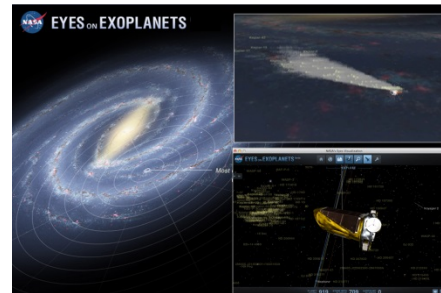
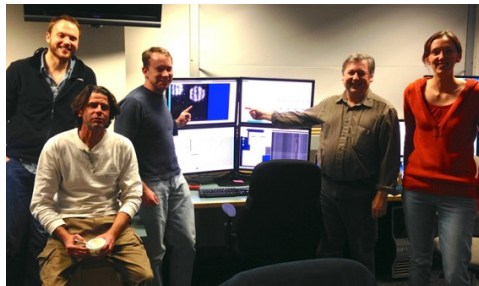
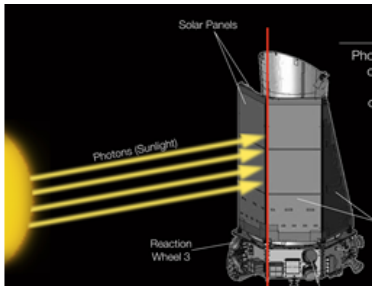
External Occulter



Coronagraph

Other Program Highlights

- Kepler** Data processing for primary mission continues
Approved to submit 2-wheel mission concept (K2) to Senior Review
- LBTI** Closed loop fringe tracking and sequence demonstrated
- Public Outreach** Eyes on Exoplanets visualization – in discussions with National Air and Space Museum for display
- NExSci** Sagan workshop approved for July 2014 “Imaging Planets and Disks”
- Keck Single Aperture** 2014A Keck Observing season allocated
OSIRIS instrument data in Keck Observatory Archive
- Technology** Coronagraph mask tests continue in High Contrast Imaging Testbeds
Starshade: successful deployment from furled configuration
- Program** ExoTAC membership updated; Alan Boss (chair)
ExoPAG active; Scott Gaudi (chair)



Looking Forward: Selected Program Milestones



ExoPlanet Exploration Program

This week	1/8	WFIRST/AFTA Evening session
	1/9-10	WFIRST/AFTA Science Definition Team meeting
Kepler	1/28	Submit two-wheel concept to Senior Review
LBTI	2/6-14	Next commissioning run
NExScI	Mid-Feb	Sagan workshop registration opens
Probe Missions	3/3	Mid-term report and briefing to CAA
Technology	1/21	TDEM-13 Pre-Proposal Telecon
	3/31	TDEM-13 proposals due
WFIRST/AFTA	224 th	AAS Meeting – AFTA science conference

You are invited to keep up with latest news at <http://exep.jpl.nasa.gov> and via New Worlds quarterly newsletter:



Acknowledgements

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