



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

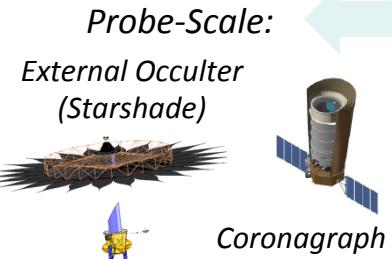
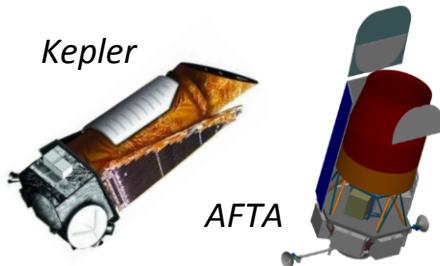
NASA Astrophysics Division, Science Mission Directorate



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

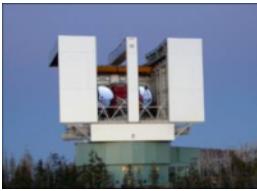


Public Engagement



Supporting Research & Technology

Key Sustaining Research



Keck Single Aperture Imaging and RV

Large Binocular Telescope Interferometer

Archives, Tools & Professional Education



NASA Exoplanet Science Institute

Technology Development



High Contrast Imaging



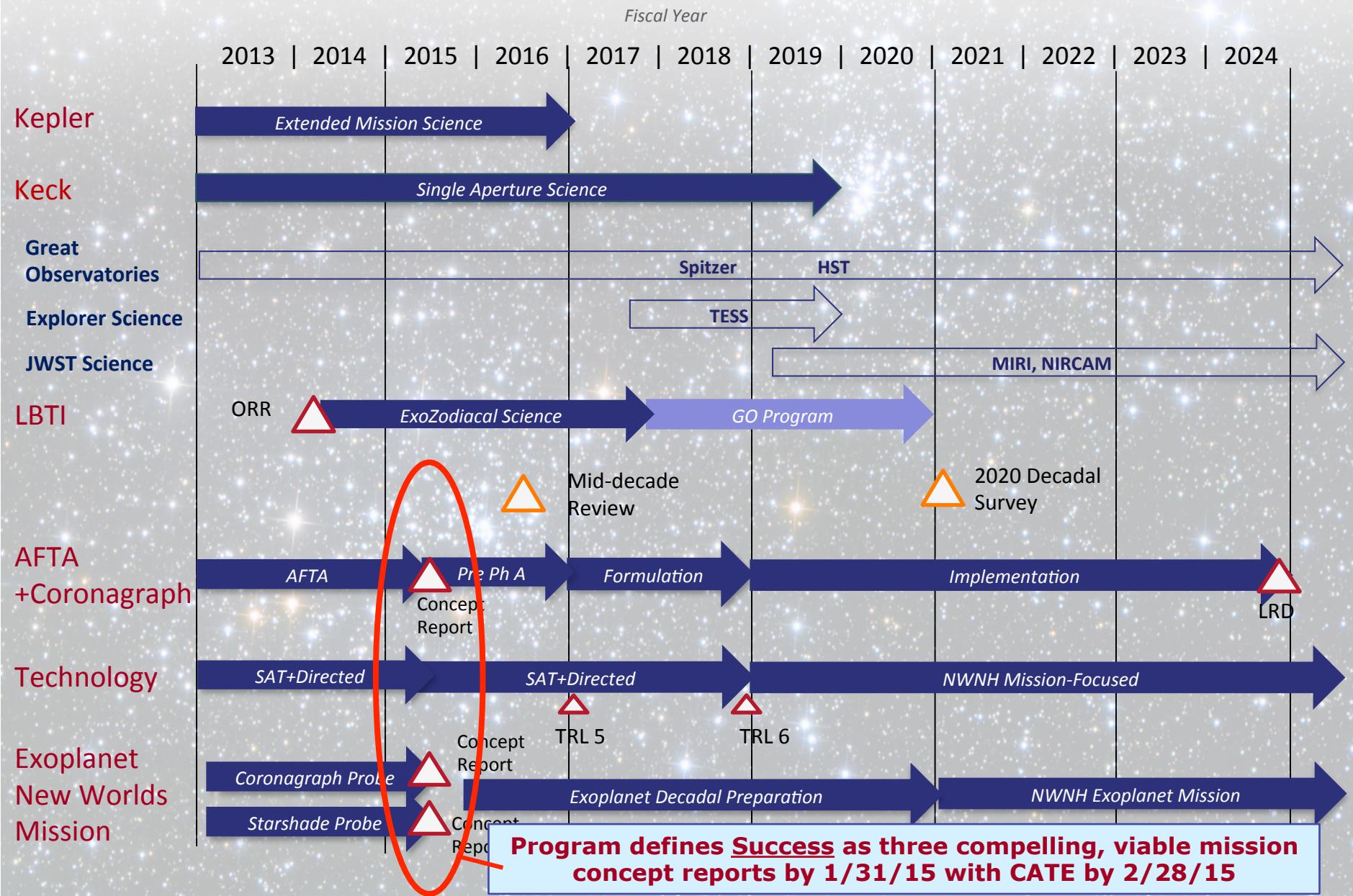
Deployable Star Shades

Exoplanet Exploration: A Decade Horizon

NASA-sponsored efforts



ExoPlanet Exploration Program



WFIRST/AFTA: Coronagraph Architectures Selected for Further Development

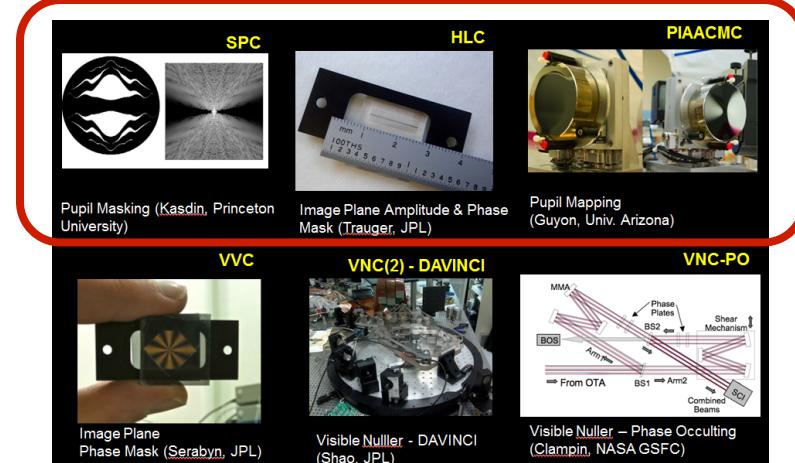


ExoPlanet Exploration Program

- 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

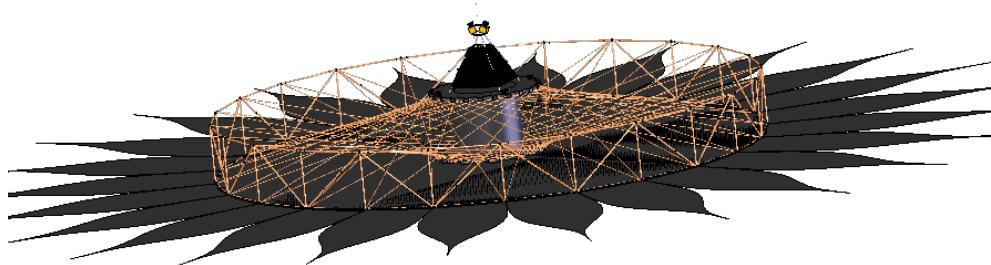




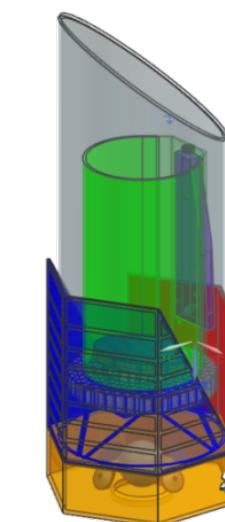
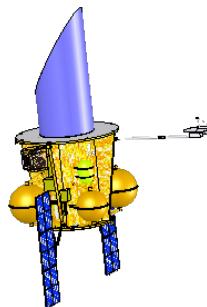
Probe-Scale Missions

ExoPlanet Exploration Program

- 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

ExoPlanet Exploration Program

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

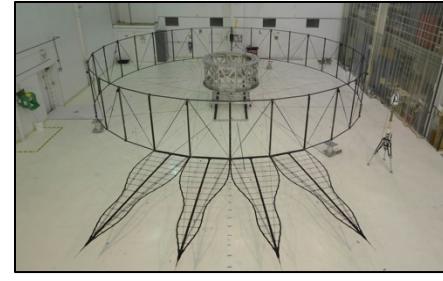
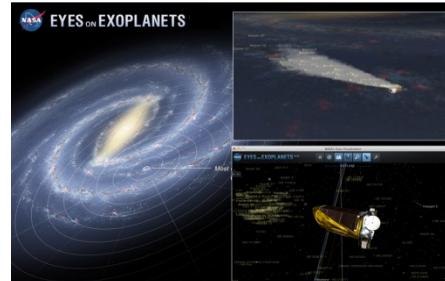
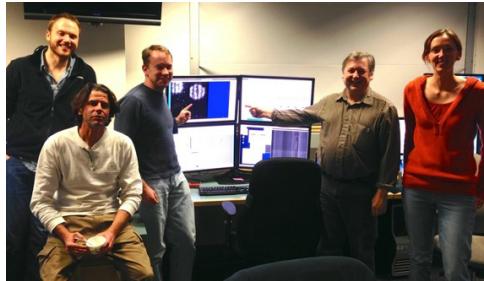
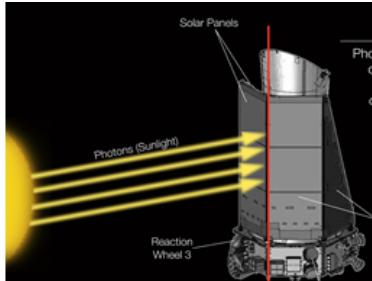
2014A Keck Observing season allocated
OSIRIS instrument data in Keck Observatory Archive

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

- 224th 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

ExoPlanet Exploration Program

- This was carried out at the Jet Propulsion Laboratory, California Institute of Technology under a contract with the National Aeronautics and Space Administration.
- Work also carried out by
 - NASA Goddard Space Flight Center
 - NASA Ames Research Center
 - Lawrence Livermore National Laboratory
- Work also carried out by University of Arizona under a contract with the Jet Propulsion Laboratory.
- Work also carried out by Princeton University, University of Arizona and Northrop Grumman Aerospace Systems under contracts with the National Aeronautics and Space Administration.
- Contributions gratefully acknowledged from Wes Traub, Peter Lawson, Nick Siegler, Feng Zhao, Bruce MacIntosh, Kevin Grady.