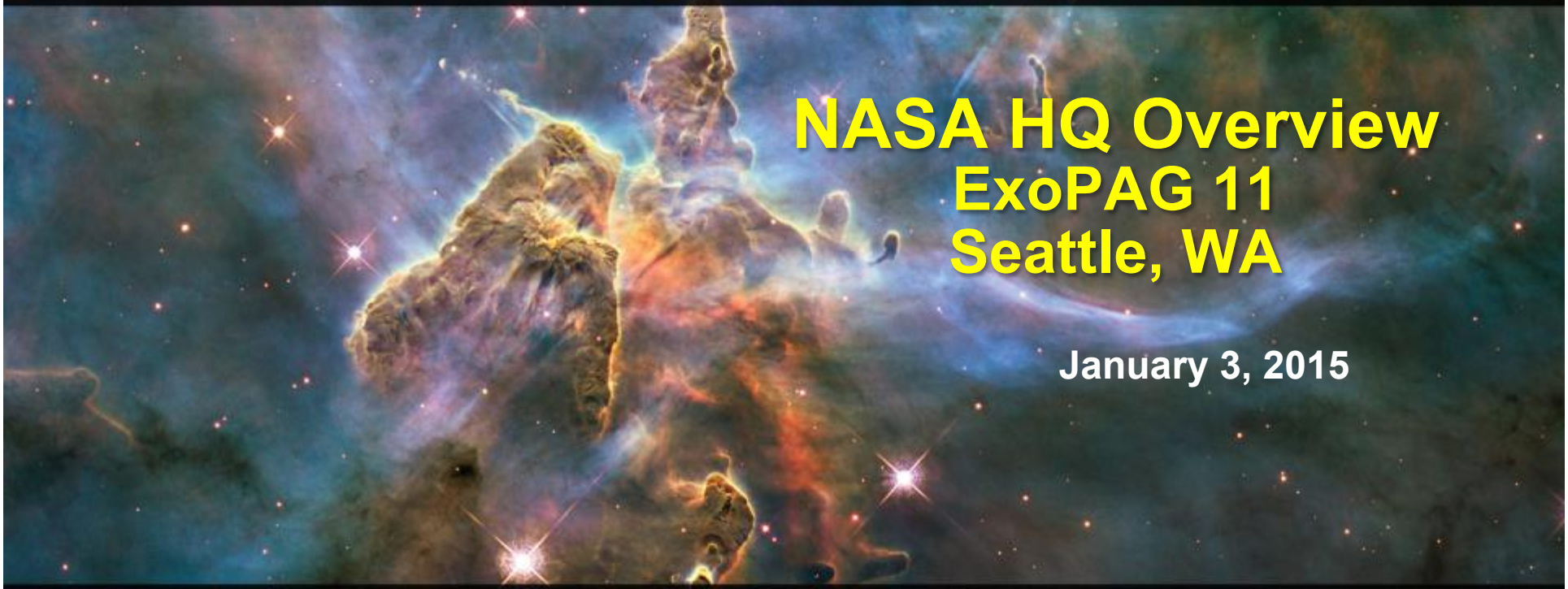
National Aeronautics and Space Administration



NASA HQ Overview
ExoPAG 11
Seattle, WA

January 3, 2015

Astrophysics

Douglas Hudgins

Exoplanet Exploration Program Scientist

www.nasa.gov

Big Picture

- The FY15 appropriations provides funding for NASA astrophysics to continue its programs, missions, and projects as planned
  - *The total funding (Astrophysics plus JWST) is $1.33B, same as FY14*
  - *Fully funds JWST to remain on plan for an October 2018 launch*
  - *Funds continued pre-formulation and tech. development leading to WFIRST-AFTA*
  - *Restores SOFIA to the budget with a 20% reduction from FY14*
  - *Provides funding for SMD's education programs*
- The operating missions continue to generate important and compelling science results, and new missions are under development for the future
  - *Chandra, Fermi, Hubble, Kepler/K2, NuSTAR, Spitzer, Suzaku, Swift, XMM-Newton continued following the 2014 Senior Review*
  - *SOFIA is in prime operations as of May 2014*
  - *Missions on track for launch include ISS-CREAM (2015), LISA Pathfinder (2015), ASTRO-H (2015), NICER (2016), TESS (2017), JWST (2018), Euclid (2020)*
  - *New Explorers being selected (SMEX in 2015, MIDEX in 2017), WFIRST being studied, NASA joining ESA's Athena and ESA's L3 gravitational wave observatory*
- Progress being made against recommendations of the 2010 Decadal Survey
  - *NRC Mid Decade Review (with NSF, DOE) to begin in early 2015*
  - *NASA initiating concepts studies for 2020 Decadal Survey*

FY15 Appropriation

Outyears are notional planning from FY15 President's budget request)

($M)	2013	2014	2015	2016	2017	2018	2019
Astrophysics	$617	$668	$685	$634	$651	$697	$993
JWST	$627	$658	$645	$620	$569	$535	$305

- Provides $77M more than the President's Budget Request for FY15
- Supports the commitment to an October 2018 launch date for JWST
- **Includes $50M for continued preformulation of WFIRST, an increase of $36M over the Administration request and comparable to FY14**
- Includes $70M for continued SOFIA operations, a reduction of $14M (17%) from FY14
- Includes $38M for scientific ballooning, an increase of $5M (15%) from FY14
  - *Note: Exoplanet suborbital balloon investigation selected under APRA 2013 (PICTURE, PI: S. Chakrabarti, UMass, Lowell)*
- **Includes $42M for Education SMD-wide as a separate budget line (so E/PO is no longer budgeted as 1% of every mission)**
- Does not specify the distribution of funding for the rest of Astrophysics, but the funding is adequate for Astrophysics to execute its program as planned in FY15.
  - *Includes support as planned in FY15 for missions under development (including TESS), operating missions (including Kepler, K2), SMEX AO, R&A, etc.*
  - *Final budget numbers available when NASA operating plan approved*

ExEP Personnel and Assignment Changes

- **Larry Petro** completed his term at NASA HQ effective 12/31/2014
- **Martin Still** has joined the Astrophysics Division as an IPA. Among other duties in the division, Martin will be serving as:
  - *Deputy Program Scientist for the Exoplanet Exploration Program (replaces Petro)*
  - *Deputy Program Scientist for the TESS mission (replaces Petro)*
- **Mario Perez** taking over the role of Program Officer for the Astrophysics component of the Exoplanet Research Program (XRP; replace Petro)
- **Debra Wallace** has taken over as Program Scientist for the Kepler Closeout and the K2 mission (replaces Hudgins, now Deputy PS)
- **Keith Chamberlin** (detaillee from GSFC) will be taking over as the Program Executive for the Kepler Closeout and K2 mission when schedule rebaseline activity is complete (replaces John Gagosian).
- Position announcement has been released for the job of Exoplanet Exploration Program Chief Scientist at JPL.
  - *Position formerly held by Wes Traub, who will be taking on role of Project Scientist for the JPL component of the WFIRST-AFTA project.*

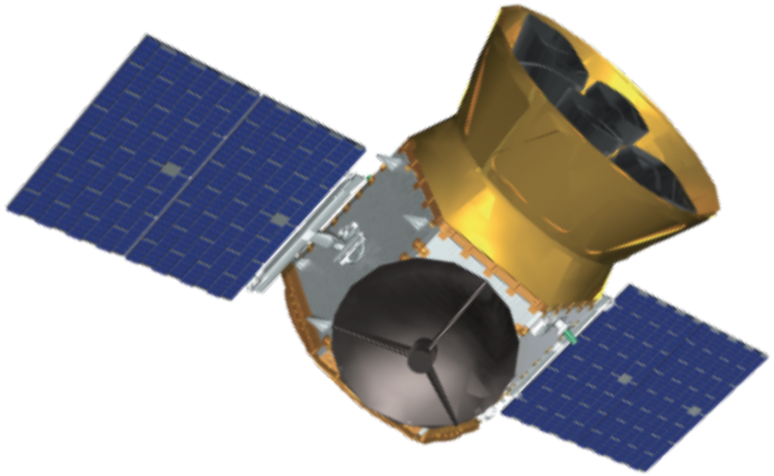
Kepler
Kepler Space Telescope

- **NASA's first space mission dedicated to the search for extrasolar planets, or exoplanets**
- **PI:** W. Borucki, NASA Ames Research Center
- **Launch Date:** March 6, 2009
- **Payload:** 0.95-meter diameter telescope designed to measure the tiny dimming that occurs when an orbiting planet passes in front of ('transits') a star
- **Scientific objectives:**
  - conduct census of exoplanet systems
  - explore the structure and diversity of extrasolar planetary systems
  - determine the frequency of habitable, Earth-sized planets in our galaxy

CURRENT STATUS:

- Kepler "K2" observation method was approved for operations through FY2016 after completion of the 2014 Senior Review.
  - Kepler is conducting observations along the ecliptic, changing its orientation four times per year.
  - The third 75-day Campaign commenced in November 2014 and runs until February 2015.
  - Targets are selected via proposals from the community. Cycle 2 proposals (covering Campaigns 6-7) are due January 16, 2015
  - December 18, 2014: First confirmed planet discovery using K2 observation method
- From 2009-13, Kepler continuously monitored 100 sq. deg. field in constellations of Cygnus and Lyra for 4+ years.
  - These observations ended after failure of 2nd reaction wheel.
- Analysis of first 4 years of Kepler data has revealed:
  - Approximately 4200 exoplanet candidates
  - Approximately 1000 candidates confirmed as planets to date
  - More than 100 planets discovered in their star's "habitable zone".
- Analysis of the full (4+ year) Kepler data set ongoing.

TESS
Transiting Exoplanet Survey Satellite



Standard Explorer (EX) Mission

PI: G. Ricker (MIT)

Mission: All-Sky photometric exoplanet mapping mission.

Science goal: Search for transiting exoplanets around the nearby, bright stars.

Instruments: Four wide field of view (24x24 degrees) CCD cameras with overlapping field of view—operating in the Visible-IR spectrum (0.6-1 micron).

Operations: 2017 launch with a 2-year prime mission

CURRENT STATUS:

- Downselected April 2013.
- Major partners:
  - PI and science lead: MIT
  - Project management: NASA GSFC
  - Instrument: Lincoln Laboratory
  - Spacecraft: Orbital Science Corp
- Tentative launch readiness date August 2017.
- High-Earth elliptical orbit (17 x 58.7 Earth radii).
- Development progressing on plan.
  - Systems Requirement Review (SRR) successfully completed on February 12-13, 2014.
  - Preliminary Design Review (PDR) successfully completed Sept 9-12, 2014.
  - Confirmation Review, for approval to enter implementation phase, successfully completed October 31, 2014.
  - Critical Design Review (CDR) planned April 2015.

NASA/NSF Exoplanet Observational Research Partnership

- NASA/NSF EXoPLanet Observational REsearch (NN-EXPLORE) Partnership established to:
  - *Take advantage of the NOAO share of the 3.5-m WIYN telescope on Kitt Peak*
  - *Enable a community based exoplanet research program in support of NSF research interests and NASA mission goals*
  - *Provide US astronomical community with open access to a world-class precision radial velocity facility instrument*
- Partnership will proceed in two stages:
  - ***2015-2018 (Stage 1)***

    Exoplanet-targeted Guest Observer program with existing instrumentation on WIYN using NOAO share of WIYN time
    - *Observing time will be awarded through normal NOAO TAC process*
    - *Program begins with 2015B observing semester (Aug. 2015 – Jan. 2016)*
    - *Proposal call expected mid- to late Feb., proposals due late March.*

    NASA funded development of facility-class Extreme Precision Doppler Spectrometer (EPDS) for the WIYN telescope
  - ***2018-TBD (Stage 2)***

    Exoplanet-targeted Guest Observer and guaranteed time program at WIYN with EPDS instrument and existing WIYN instruments

EPDS Solicitation

NASA intends to procure a cutting-edge, **facility-class** EPDS instrument for installation at the 3.5-m WIYN telescope.

Goal is to enable a community-driven program of exoplanet science that addresses the strategic goals of the NASA and the NSF, and the recommendations of the Astro2010 Decadal Survey.

- New Worlds, New Horizons:

  "NASA and NSF should support an aggressive program of ground-based high-precision radial velocity surveys of nearby stars to identify potential candidates … for a future space imaging and spectroscopy mission".

Key Features:

- $7M budget target over the period FY15 – FY18. This is **NOT** a cost cap. However, availability of funds will be a factor in the selection of an instrument.
- Spectral coverage/calibration source and methodology are at the discretion of the proposer.
- Requirement that instrument must be capable of providing a velocity precision of <50 cm/s, with a goal of 10 cm/s (excluding stellar jitter).
- Anticipate allocation of GTO time for the instrument team during the initial operational phase (2018 – 2023) of the instrument.

EPDS Solicitation

NASA will conduct a two step evaluation process

- **Step 1** – scientific and technical evaluation of proposals submitted in response to solicitation
- Downselect to not more than 2 instrument concepts
- **Step 2** – Phase A study to mature design, facility and telescope interface requirements, cost, and risk of downselected instrument concepts.
- Downselect to one instrument to proceed to implementation.

Timeline for EPDS

- Community announcement of plan to issue a solicitation for EPDS instrument released 16 December 2014
- Release of the solicitation (through amendment to ROSES 2014 NRA) anticipated by mid-January 2015.
- Proposal deadline not less than 90 days after release of the solicitation.
- Step 1 downselect to not more than two proposed instruments – August 2015
- Phase A studies – September 2015 – February 2016
- Selection of one instrument concept to move forward – March 2016
- Installation and commissioning of the EPDS at the WIYN telescope - 2018

Preparing for the 2020 Decadal Survey
Large Mission Concepts

The 2020 Decadal Survey will prioritize large space missions to follow JWST and WFIRST.

➡ *To enable that prioritization, NASA will need to provide information on several candidate large space mission concepts for consideration by the 2020 Decadal Survey Committee.*

NASA also needs to initiate technology development for candidate large missions so that technology will be ready when needed.

- *Technology needs to be sufficiently mature when it is time to start the highest priority large mission in the 2020 Decadal Survey.*
- *The next large mission after WFIRST could be started when funding becomes available as WFIRST approaches launch in the early- to mid-2020s.*

Sneak Preview: P. Hertz is going to ask the Astrophysics PAGs to organize community input on the small set of missions that ApD proposes to study during the latter half of the decade. Each PAG will submit a report summarizing the input of their constituent communities for consideration by the NAC Astrophysics Subcommittee.

NASA Exoplanet Systems Science NExSS Network

Exoplanet research is inherently multidisciplinary, cutting across disciplines and organizational boundaries within SMD.

NExSS will be a research coordination network designed to:

- Further the joint Astrophysics/Planetary Science strategic objective to explore exoplanets as potential habitable and inhabited worlds outside our solar system.
- Leverage existing Programs in SMD to advance the field of Exoplanet Research, specifically research in comparative planetology, biosignature and habitat detection, and planet characterization.
- Establish a mechanism to break down the barriers between, divisions, disciplines and stove piped research activities.

For more information, see Christina Richey

Poster: 242.04. *An Update on the NASA Planetary Science Division and Astrophysics Research and Analysis Programs.*
Special times for NExSS discussion: Tues.,1-1:30 pm and 3:30-4 pm

Visiting Experienced Scientists at NASA HQ

Looking for a few good astrophysicists….

- Seeking one or more experienced scientists
  - to take leave from their U.S. home institution
  - for a 2-year visiting position (can extend up to 6 years)
  - to work in Astrophysics at NASA Headquarters
- Duties include
  - Management of the Astrophysics grants programs;
  - Planning, development, and management of NASA missions;
  - Strategic planning for the future of NASA astrophysics.
- Requires Ph.D. or equivalent, relevant research experience, familiarity with NASA research award programs and/or missions, and the ability to communicate effectively.
- For additional info, talk with any of the Astrophysics HQ staff.

Apply by January 31, 2015

http://jobregister.aas.org/job_view?JobID=46612

Backup

Astrophysics Division - Science Mission Directorate

Jan 06, 2015

Resource Management
Omana Cawthon+
Clemencia Gallegos-Kelly+

Director
Paul Hertz
Deputy Director
Andrea Razzaghi

Lead Secretary: Kelly Johnson
Secretary: Leslie Allen
Program Support Specialist: Jackie Mackall

Cross Cutting
Technology Lead: Billy Lightsey*
Division E/PO POC: Hashima Hasan (Lead Comm Team)
Division Public Affairs POC: Lisa Wainio*
Information Manager: Lisa Wainio*
Hubble 25 Coordinator: Amber Straughn*

Astrophysics Research

Program Manager: Wilt Sanders*
Program Support: Janet Larson*
Astrophys Data Analysis: Doug Hudgins*
Astrophysics Theory: Keith MacGregor*
Exoplanet Research: Mario Perez*
APRA lead: Michael Garcia*
Cosmic Ray, Fund Phys: Vernon Jones, Keith MacGregor*
Gamma Ray/X-ray: Michael Garcia*, Stefan Immler*
Lou Kaluzienski, Rita Sambruna, Wilt Sanders*
Optical/Ultraviolet: Michael Garcia*, Hashima Hasan, Mario Perez*, Martin Still*
IR/Submillimeter/Radio: Dominic Benford*, Doug Hudgins, Eric Tollestrup*
Lab Astro: Vacant
Roman Tech Fellows: Billy Lightsey*
Data Archives: Hashima Hasan
Astrophys Sounding Rockets: Wilt Sanders*
Balloons Program: Vernon Jones(PS), Mark Sistilli (PE)

Programs / Missions

Exoplanet Exploration (EXEP)

Program	**Doug Hudgins** (Program Scientist)	**John Gagosian** (Program Executive)
Keck	Hashima Hasan	Mario Perez*
Kepler	Debra Wallace*	John Gagosian
LBTI	Hashima Hasan	Mario Perez*
NExScI	Hashima Hasan	Mario Perez*

Cosmic Origins (COR)

Program	**Mario Perez*** (Program Scientist)	**Lia LaPiana** (Program Executive)
Herschel	Dominic Benford*	Jeff Hayes
Hubble	Michael Garcia*	John Gagosian
JWST	Hashima Hasan	N/A
SOFIA	Eric Tollestrup*	John Gagosian
Spitzer	Keith Macgregor*	Jeff Hayes

Physics of the Cosmos (PCOS)

Program	**Rita Sambruna** (Program Scientist)	**Lia LaPiana** (Program Executive)
Athena	Michael Garcia*	Lia LaPiana
Chandra	Stefan Immler*	Jeff Hayes
Euclid	Eric Tollestrup*	Keith Chamberlin*
Fermi	Keith MacGregor*	Jeff Hayes
Planck	Rita Sambruna	Jeff Hayes
ST-7/LPF	Wilt Sanders*	Keith Chamberlin*
XMM-Newton	Stefan Immler*	Jeff Hayes

Astrophysics Explorers (APEX)

Program	**Wilt Sanders*** (Program Scientist)	**Mark Sistilli** (Program Executive)
ASTRO-H	Lou Kaluzienski	Jeanne Davis
NICER	Rita Sambruna	Jeanne Davis
NuSTAR	Lou Kaluzienski	Jeff Hayes
Suzaku	Stefan Immler*	Jeff Hayes
Swift	Martin Still*	Jeff Hayes
TESS	Doug Hudgins	Mark Sistilli
WFIRST/AFTA	Dominic Benford*	Lia LaPiana

+ Member of the Resources Mgmt Division
** Detailee, IPA, or contractor*
JWST now part of the JWST Program Office.

Linda Sparke on detail to MSFC


Formulation
Implementation
Primary Ops
Extended Ops
XMM-Newton (ESA)
12/10/1999
Swift
11/20/2004
Suzaku (JAXA)
7/10/2005
Fermi
6/11/2008
Euclid (ESA)
2020
Hubble
4/24/1990
Kepler
3/6/2009
JWST
2018
Spitzer
8/25/2003
ASTRO-H (JAXA)
2015
Chandra
7/23/1999
NICER (on ISS)
2016
NuSTAR
6/13/2012
TESS
2017
LISA Pathfinder (ESA)
2015
SOFIA
Full Ops 2014
NASA
Astrophysics
Strategy