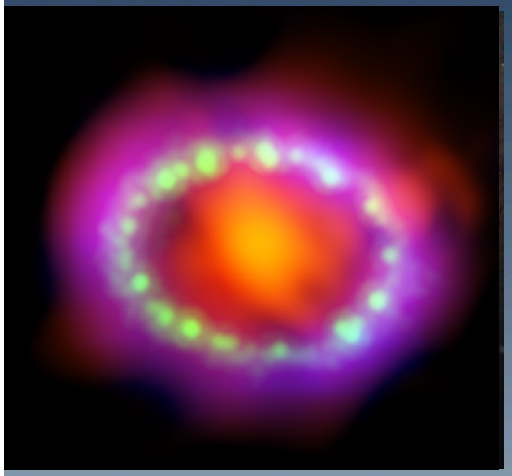
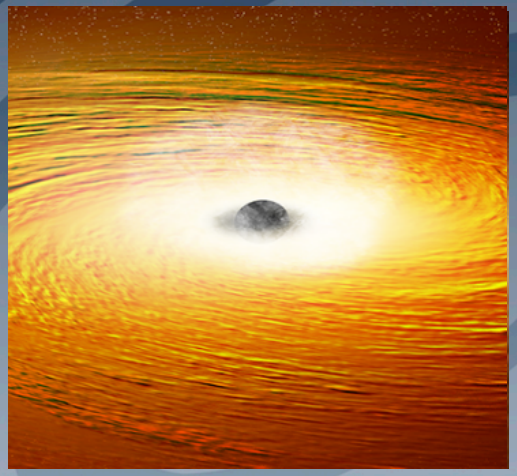
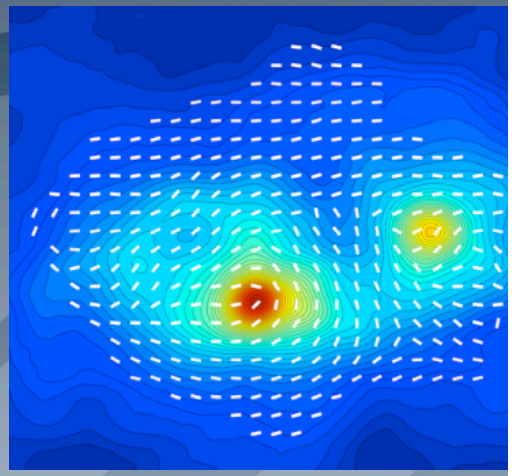
National Aeronautics and Space Administration

# Astrophysics



## NASA Update

PCOS Town Hall, AAS Head Meeting
August 22, 2017


**Stefan Immler**
High Energy Astrophysics Portfolio Lead
Chandra, Fermi, NuSTAR, XMM Program Scientist
NICER, R&A and APRA Deputy
NASA Headquarters

# Astrophysics - Big Picture

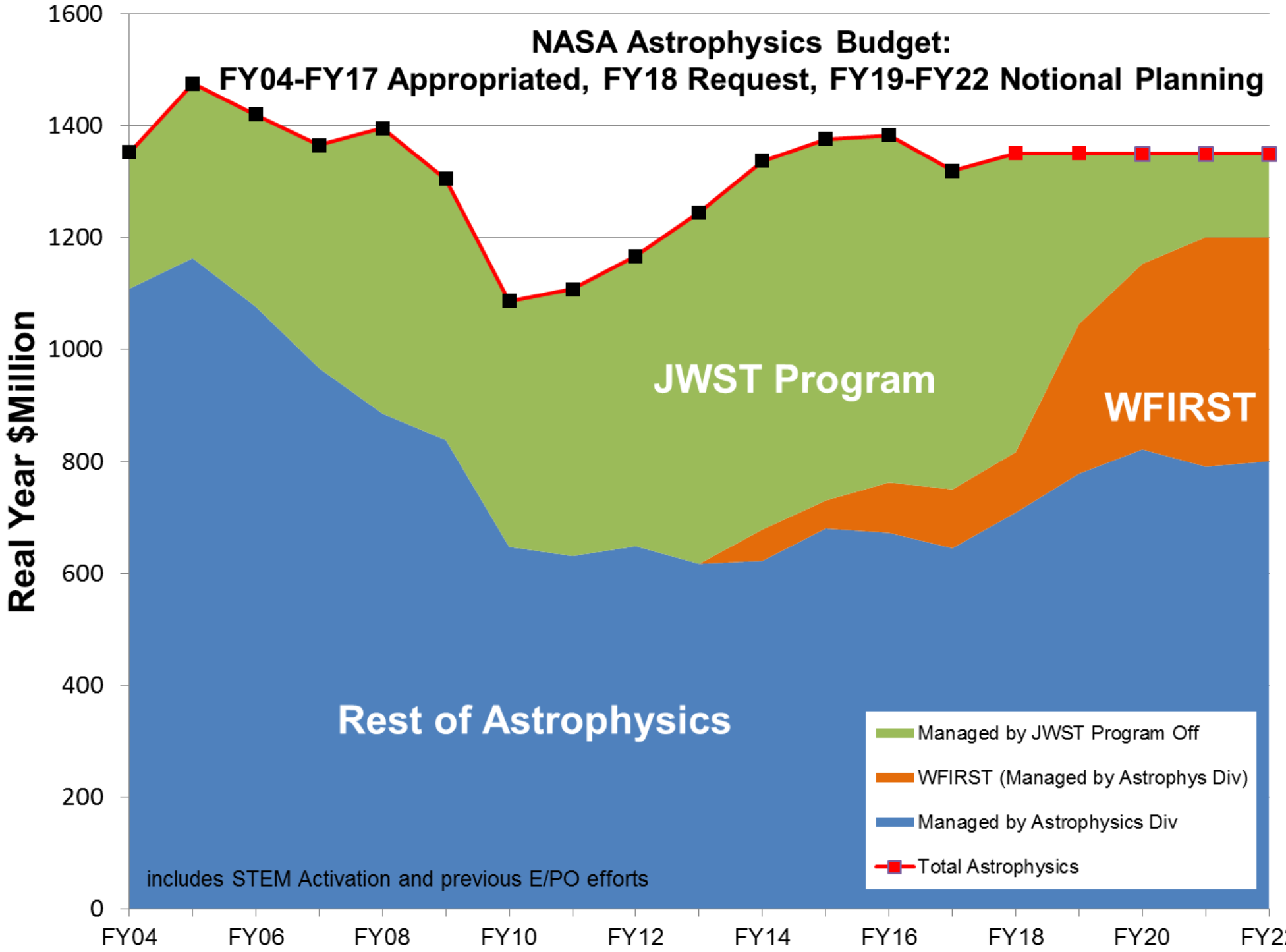
- **The FY17 appropriation and FY18 budget request provide funding for NASA astrophysics to continue its planned programs, missions, projects, research, and technology.**
  - Total funding (Astrophysics including Webb) remains at ~$1.35B.
  - Funds Webb for an October 2018 launch, WFIRST formulation, Explorers mission development, increased funding for R&A, new suborbital capabilities, continued technology development.
- **NASA continues to prioritize implementation of the recommendations of the 2010 Decadal Survey.**
  - National Academies' 2016 Midterm Assessment Report validates NASA's progress.
  - NASA is conducting large and medium mission concept studies for 2020 Decadal Survey (see later talk in this Town Hall).

# FY17 Consolidated Appropriations Bill

- The FY17 Appropriation for Astrophysics resulted in a reduction of $63.0M for Astrophysics (including Webb) relative to the FY16 funding level.

| $M | FY16 Actual | FY17 Request | FY17 Approp | |
|---|---|---|---|---|
| Webb | 620.0 | 569.4 | 569.4 | Planned decrease of $50.6M |
| Astrophysics | 762.4 | 781.5 | 750.0 | Down $31.5M from FY17 request |
| Astrophysics w/ Webb | 1,382.4 | 1,350.9 | 1,319.4 | Down $63.0M from FY16 actual |

- The FY17 Appropriation for Astrophysics resulted in a reduction of $31.5M for Astrophysics (including Webb) relative to the FY17 budget request.
- The FY17 Appropriation for Astrophysics resulted in a reduction of up to $47.4M for Astrophysics programs excluding Webb, Hubble, SOFIA, WFIRST, relative to the FY17 budget request.


NASA Astrophysics Budget:
FY04-FY17 Appropriated, FY18 Request, FY19-FY22 Notional Planning
Real Year $Million
1600
1400
1200
1000
800
600
400
200
0
FY04
FY06
FY08
FY10
FY12
FY14
FY16
FY18
FY20
FY22
JWST Program
WFIRST
Rest of Astrophysics
includes STEM Activation and previous E/PO efforts
Managed by JWST Program Off
WFIRST (Managed by Astrophys Div)
Managed by Astrophysics Div
Total Astrophysics

# Astrophysics Missions in Development

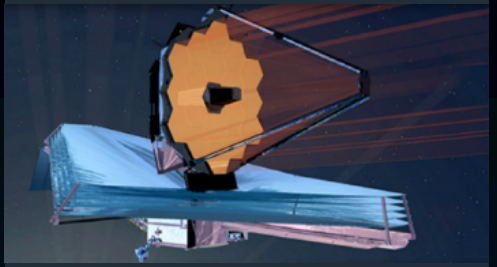
## ISS-CREAM
8/2017
NASA Mission


Cosmic Ray Energetics
And Mass

## TESS
3/2018
NASA Mission

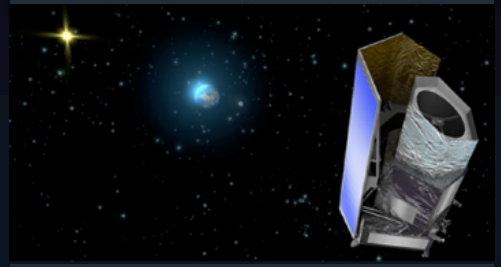
Transiting Exoplanet
Survey Satellite

## Webb
10/2018
NASA Mission



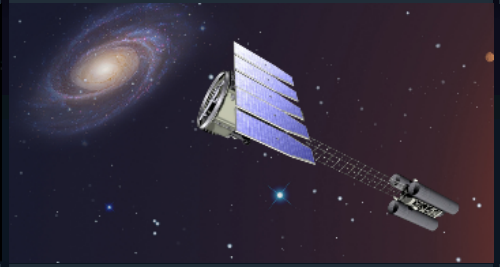
James Webb
Space Telescope

## Euclid
2020
ESA-led Mission



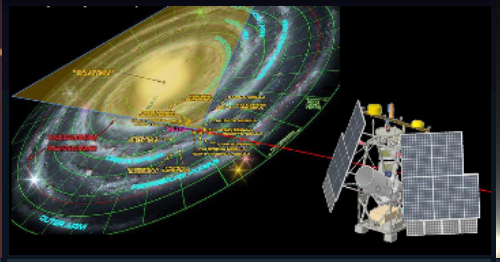
NASA is supplying the NISP
Sensor Chip System (SCS)

## IXPE
2020
NASA Mission



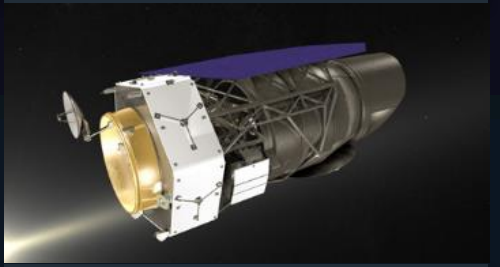
Imaging X-ray
Polarimetry Explorer

## GUSTO
2021
NASA Mission



Galactic/ Extragalactic ULDB
Spectroscopic Terahertz Observatory

## WFIRST
Mid
2020s
NASA Mission

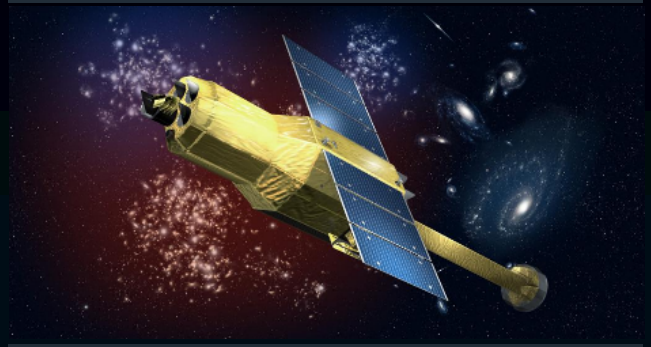


Wide-Field Infrared
Survey Telescope

# Astrophysics Missions under Study

## XARM
2021

JAXA-led Mission



NASA is supplying the Resolve calorimeter detectors, ADRs, and SXTs

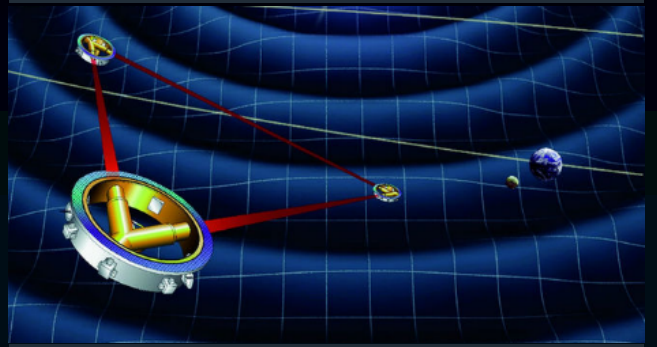
## Athena
Late 2020s

ESA-led Mission

NASA is supplying elements for both instruments

## LISA
Mid 2030s

ESA-led Mission



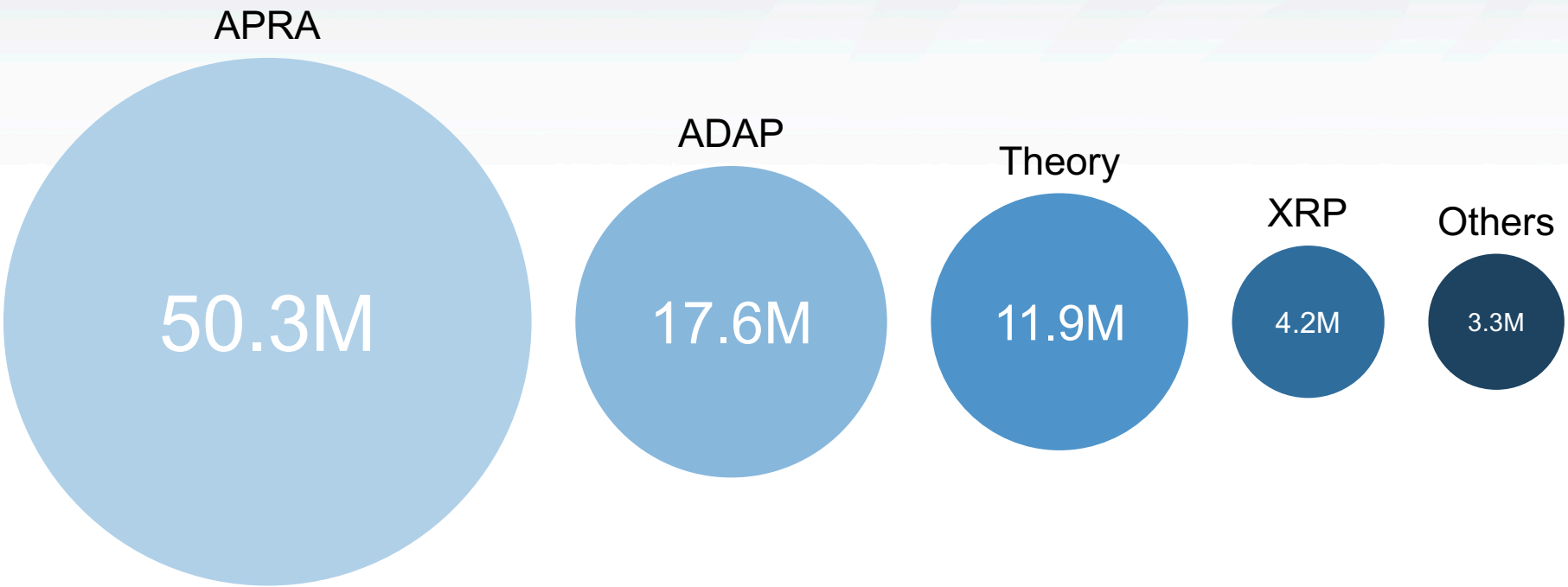
NASA is developing technology for both the payload and the mission

# Explorers Concept Study Selections

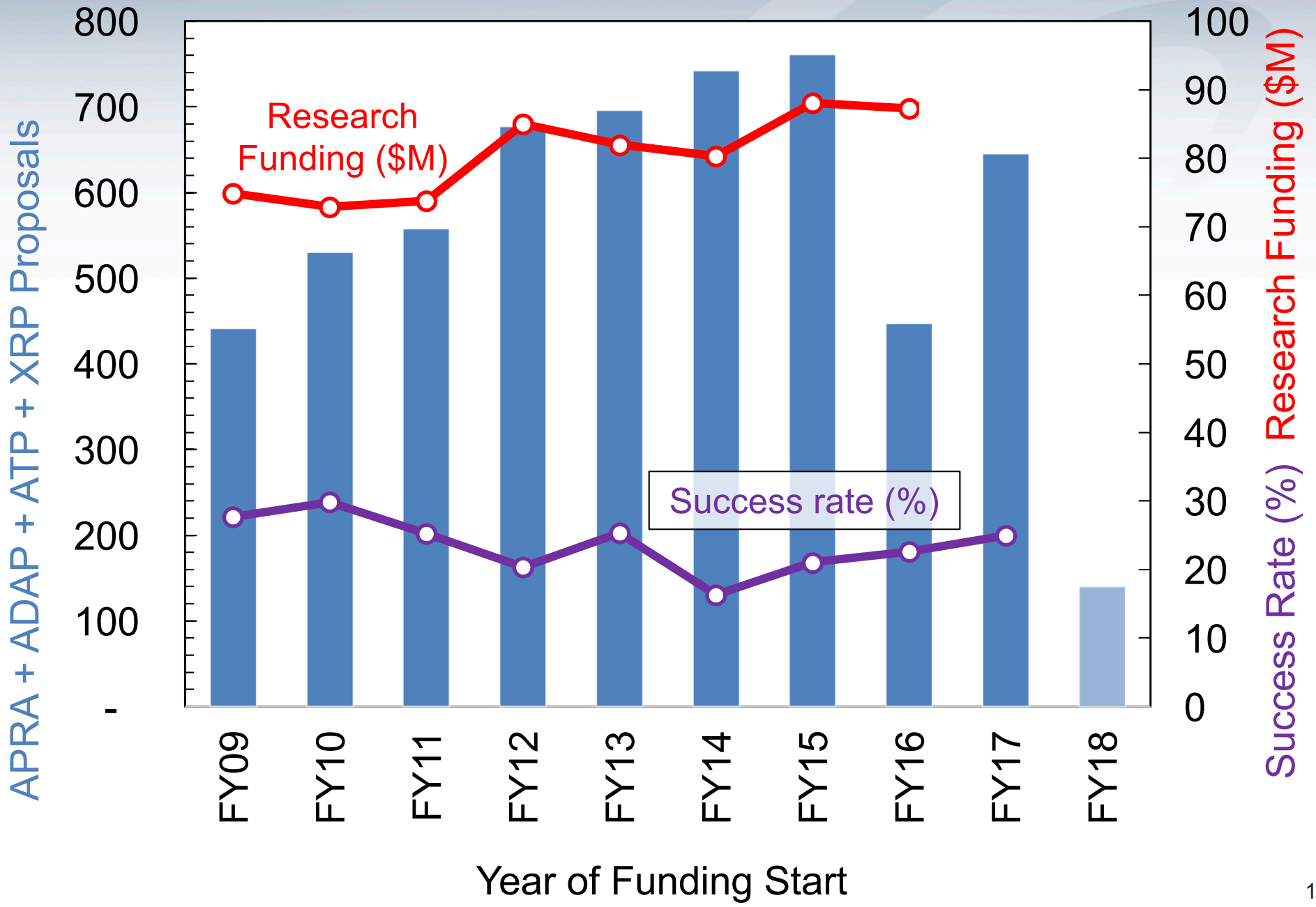
- NASA Headquarters selected six astrophysics Explorers Program proposals for concept studies in August 2017.
- 3 Medium-Class Explorer selections:
  - **Arcus: Exploring the Formation and Evolution of Clusters, Galaxies and Stars**
    - PI: Randall Smith (SAO)
  - **Fast INfrared Exoplanet Spectroscopy Survey Explorer (FINESSE)**
    - PI: Mark Swain (JPL)
  - **Spectro-Photometer for the History of the Universe, Epoch of Reionization, and Ices Explorer (SPHEREx):** An All-Sky Spectral Survey
    - Jamie Bock (Caltech)
- 3 Mission of Opportunity (MoO) selections:
  - **Compton Spectrometer and Imager Explorer (COSI-X), a Small Complete Superpressure Balloon Mission**
    - PI: Steve Boggs (UC Berkeley)
  - **Transient Astrophysics Observer on the International Space Station (ISS-TAO)**
    - PI: Jordan Camp (GSFC)
  - **Contribution to ARIEL Spectroscopy of Exoplanets (CASE). Conditional selection.**
    - Mark Swain (JPL)

# Research and Analysis (R&A) Update

# FY16 R&A Spending Summary

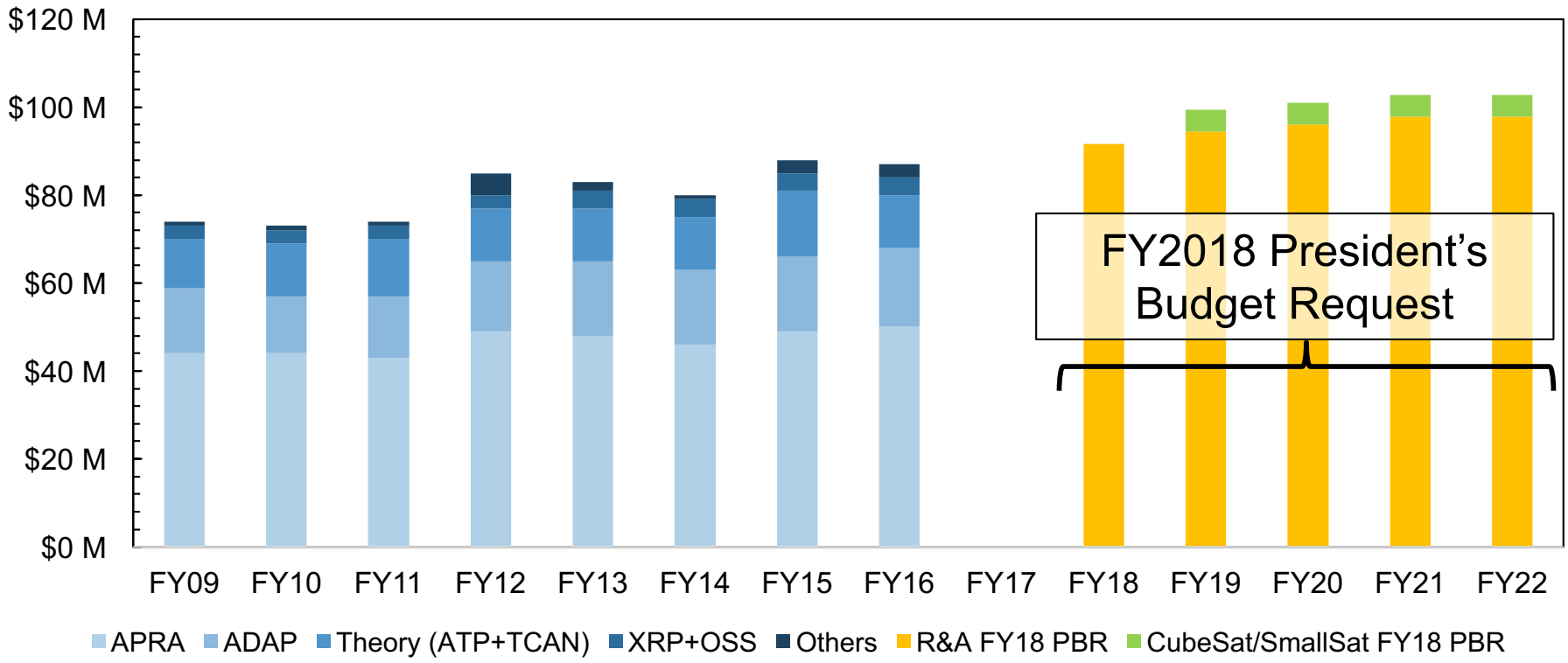


# R&A Program Pressure



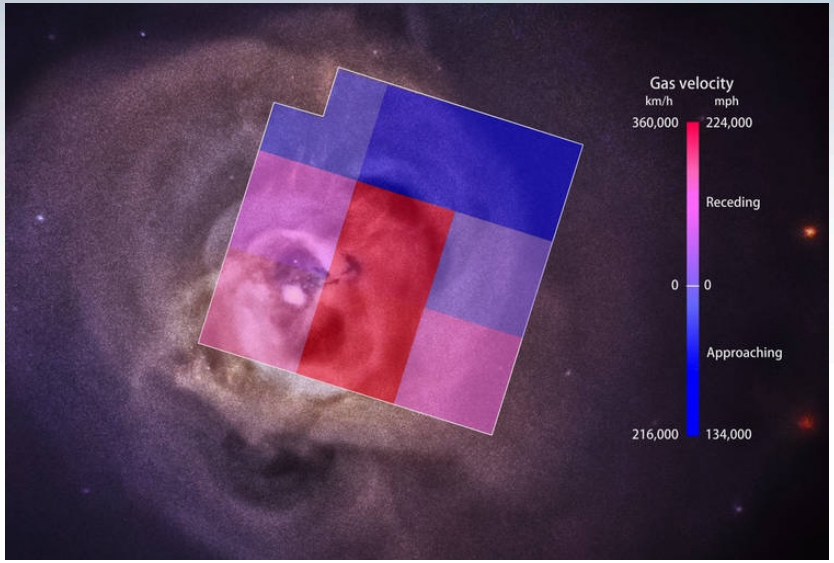
# R&A Budget Trends

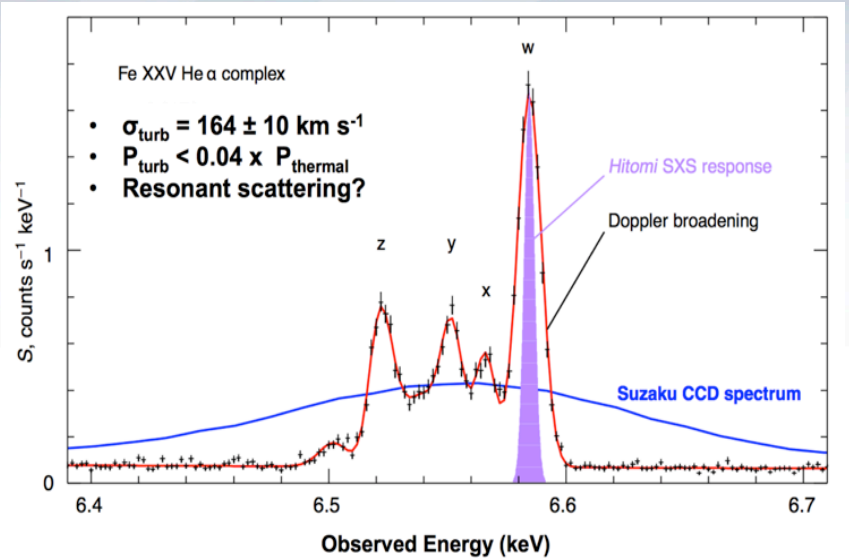
| Program | FY09 | FY10 | FY11 | FY12 | FY13 | FY14 | FY15 | FY16 | FY17 | FY18 | FY19 | FY20 | FY21 | FY22 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| APRA | $44 M | $44 M | $43 M | $49 M | $48 M | $46 M | $49 M | $50 M | | | | | | |
| ADAP | $15 M | $13 M | $14 M | $16 M | $17 M | $17 M | $17 M | $18 M | | | | | | |
| Theory (ATP+TCAN) | $11 M | $12 M | $13 M | $12 M | $12 M | $12 M | $15 M | $12 M | | | | | | |
| XRP+OSS | $3 M | $3 M | $3 M | $3 M | $4 M | $4 M | $4 M | $4 M | | | | | | |
| Others | $1 M | $1 M | $1 M | $5 M | $2 M | $1 M | $3 M | $3 M | | | | | | |
| R&A FY18 PBR | | | | | | | | | | $92 M | $95 M | $96 M | $98 M | $98 M |
| CubeSat/SmallSat FY18 PBR | | | | | | | | | | $0 M | $5 M | $5 M | $5 M | $5 M |
| **Research Total** | **$74M** | **$73M** | **$74M** | **$85M** | **$83M** | **$80M** | **$88M** | **$87M** | | **$92M** | **$100M** | **$101M** | **$103M** | **$103M** |



# XARM Update and Announcement

# XARM Update




- Substantial progress made on XARM.
- Mission will include an X-ray microcalorimeter (named Resolve) and an X-ray imager.
- XARM approved by Japanese Diet, NASA formulation this summer.
- NASA KDP-C (confirmation review) expected late 2017.

# XARM Community Participation

- The US community should expect major opportunities to participate in XARM, even more so than Hitomi.

- NASA will issue three open calls to the community:

1. **Call for a small number XARM Participating Scientists (expected in 2017).**
   - Play a major role in the pre-launch science planning of XARM.
   - Advise the XARM project on issues related to mission science goals and performance.
   - Update the Hitomi target list of essential observations to be carried out during the first six to nine months of XARM operations (named the Performance Verification phase of the mission).
   - Receive full access to all PV data.
   - Proposals from PIs at all career stages are strongly encouraged.

# XARM Community Participation

2. **Call for PV Phase Target Team Members (expected before launch).**
   - Designed to enable broad community participation in the early operation of XARM.
   - NASA will select numerous community members to join “target teams” alongside the XARM Science Team.
   - Community participants will receive access to PV phase data for a given object.

3. **Call for GO proposals.**
   - Following the conclusion of the PV phase of the mission approximately six to nine months after launch, XARM observing time will be dedicated to Guest Observations allocated through an Announcement of Opportunity process.


Revised
August 22, 2017