Hubble Captures First-Ever Predicted Exploding Star

Supernova Refsdal • Galaxy Cluster MACS J1149.5+2223 • HST WFC3 ACS

October 30, 2015
December 11, 2015

November–December, 2014

NASA, ESA, and P. Kelly (University of California, Berkeley)
Hubble Discovers Moon Orbiting the Dwarf Planet Makemake

KBO Makemake
HST WFC3/UVIS F350LP

S/2015 (136472) 1 MK 2

April 27, 2015
20,000 mi
32,000 km
0.85"

April 29, 2015

NASA, ESA, A. Parker and M. Buie (SWRI), W. Grundy (Lowell), and K. Noll (GSFC)
New Roles

HST Mission Head
Tom Brown

MultiMission Project Scientist
Jason Kalirai
Hubble Space Telescope

- Science/Mission Ops – see Jenkner and Crouse talks
- 5 Year Contract Extension (2016-2021)
- Cycle 24 Call for Proposals issued January 13
- GO/AR funding set at $28.9M for Cycle 23
- Senior Review of Operating Missions
  - Proposal submitted January 21
  - Site visit at STScI March 8-10
Hubble Science Productivity is Outstanding

13,850 publications to date

843 in 2015!
Frontier Fields Will Be Completed this Summer

• Four clusters (+ four parallel deep fields) complete

• Continuing with final two clusters in Cycle 23
  • Abell S1063 - first epoch complete
  • Abell 370 - first epoch complete

Abell 2744  MACS0416  MACS1149  MACS0717
James Webb Space Telescope

- Science/Mission Development
  - Mission on budget and schedule

- Cryo-vaccum test #3
  - Approximately 100 days, very successful
  - Great support during “Snowzilla”

- STScI work is progressing well, science community is excited

- Mission Ops Center construction is complete
JWST Optical Assembly in the SSDIF

Cryo-Vacuum Test #3
JWST Mission Operations Center at STScI
SIMPLIFIED SCHEDULE

OTIS = Optical Telescope + ISIM

months of project funded critical path (mission pacing) schedule reserve

Spacecraft panels to I&T
Spacecraft Fabrication & Assembly
Flight Sunshield Fabrication

Panel Integration

Spacecraft I & T

Sunshield Integration

Observatory I & T

Cryocooler Assembly & Test

Cryocooler

Cryovacuum Test #3

Science Instruments

OTIS

Backplane Assembly
Optics Integration

Telescope

Northrop-Grumman
Goddard Space Flight Center
Johnson Space Center
Guiana Space Center
The Astrophysics Frontier: JWST + WFIRST

Hubble: The Foundation

100x More Power

100x Wider Area

>1,000,000 galaxies in each image
Wide Field Infrared Survey Telescope (WFIRST)

**WFIRST**

- Hubble’s power with Hubble’s resolution and image clarity
- 100x larger field of view than Hubble
- Tremendous science synergy with JWST
- 2.4 meter telescope donated from NRO
- Coronagraph - “proof of concept” for “Life Finding” telescope

Science Investigation Teams and Formulation

- Selected in Dec 2015
- Phase A started February 2016
- STScI has significant science operations role
- Launch in ~2024-2025

STScI:

- **Archive**
  - Hosts the full data archive through MAST – large activity
- **WFI/IFU pipeline**
  - Develop WFI processing process and pipeline algorithms - large activity
  - Process all WFI data to L2b and HLS/GO data to L3 using SIT-developed algorithms – very large activity
- **WFI calibration**
  - Schedules and processes calibration data from WFI (mostly embedded in survey)
- **Scheduling**
  - Detailed (e.g., weekly) scheduling of observations – large activity
- **Implement WFI GO Program & I/F to Community**
  - Allocation of GO observing via prioritized proposals
  - Provide community tools for planning to propose WFI GO observations
- **WFI Community & Science Team Support**
  - Develop/maintain tools for WFI GO planning, analysis; help desk
  - Provide documentation to community on WFI instrument
- **WFI Instrument Commanding**
  - Produce commands for WFI instrument modes and operation
- **WFI Commissioning**
  - Produce protocols and detailed plans for WFI commissioning
- **WFI Community Engagement**
  - WFI science outreach only, including cosmology, HLS – but not μLensing
A Snapshot of WFIRST Science

Direct Space-Based Imaging and Characterization of Nearby Exoplanets

Measuring the History of Dark Energy

2700 Supernovae Across Cosmic Time (Distance Ladder)

Great Observatory Guest Observer Program

2800 planets outside of Kepler's Search Volume
Questions

• HST and JWST operations will overlap. This presents challenges and opportunities. Do you have any suggestions for how to maximize the science return of these missions in that overlapping time period?

• Assuming Hubble operates for 5 (or 10?) more years, what is your advice on using the limited COS detector resources available?

• What are your thoughts on the types/sizes of programs Hubble should undertake in its remaining years?

• Are there specific initiatives you would like to see STScI undertake in support of “legacy” HST science?