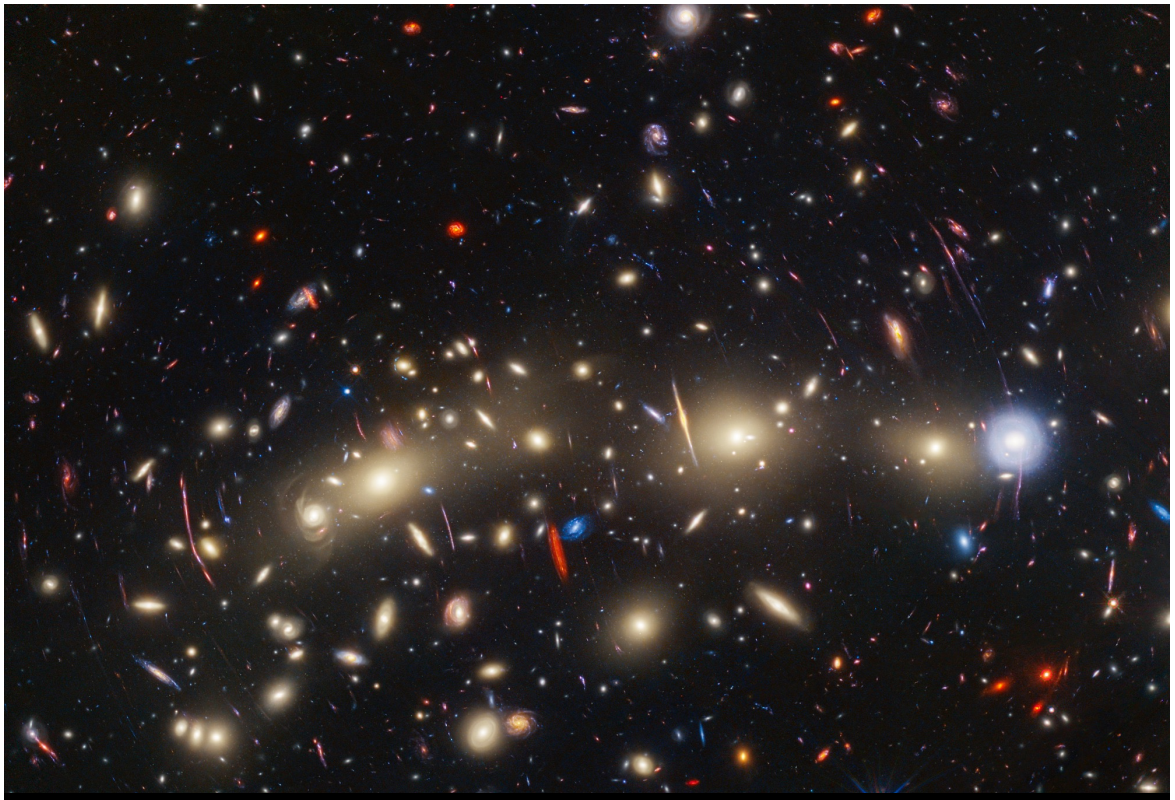
HST/GSFC Project Report



This panchromatic view of galaxy cluster MACS0416 was created by combining visible-light data from the Hubble Space Telescope with infrared observations from the James Webb Space Telescope. The resulting wavelength coverage, from 0.4 to 5 microns, reveals a vivid landscape of galaxies that could be described as one of the most colorful views of the universe ever created.
Credits: NASA, ESA, CSA, STScI, Jose M. Diego (IFCA), Jordan C. J. D'Silva (UWA), Anton M. Koekemoer (STScI), Jake Summers (ASU), Rogier Windhorst (ASU), Haojing Yan (University of Missouri)

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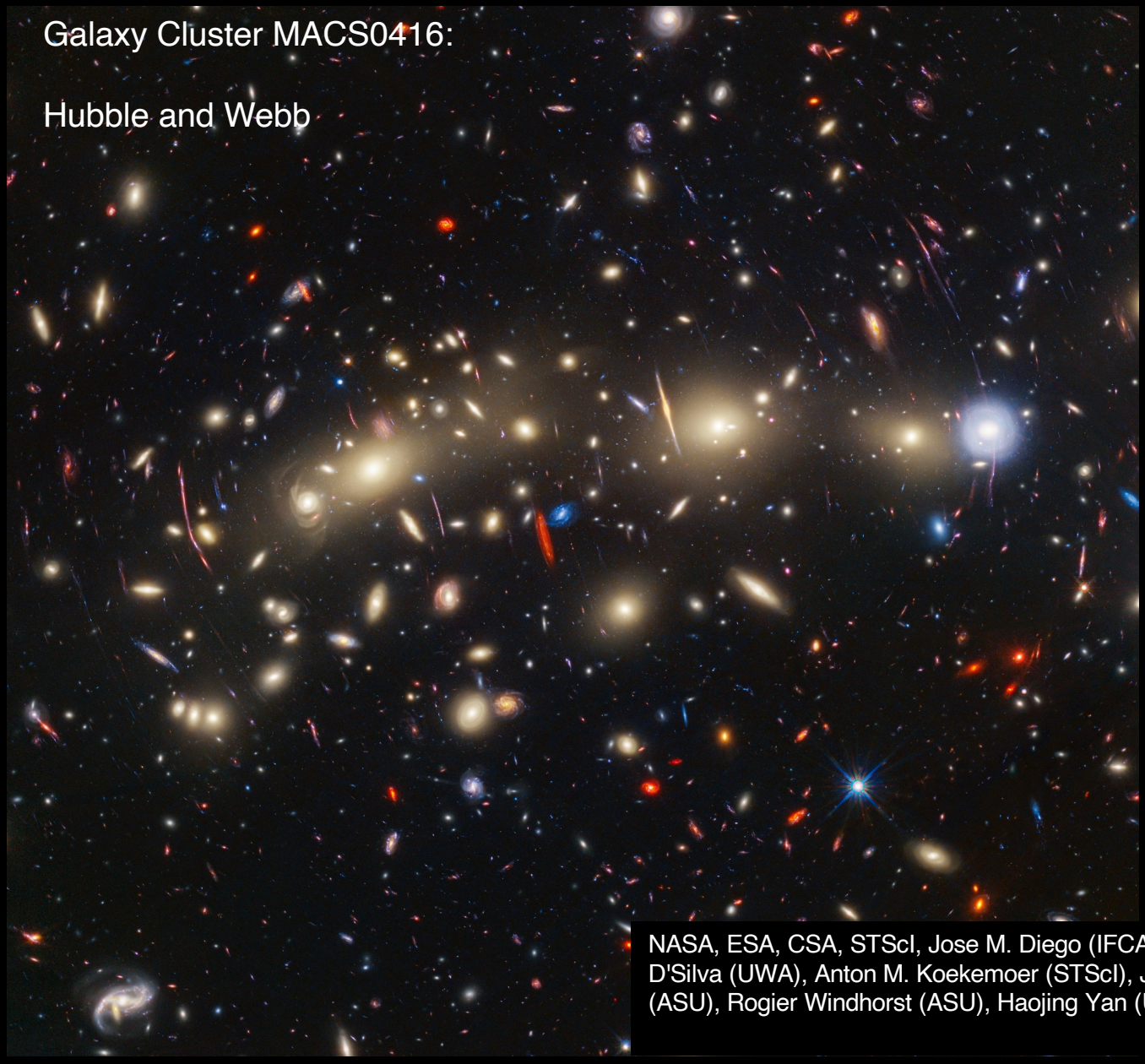
Space Telescope Users Committee Meeting
November 30, 2023

Agenda

- Science Highlights
- Observatory performance
  - Gyros
  - Fine Guidance Sensor
- Sustaining Engineering Initiatives
  - Science Instrument Command & Data Handling B-Side Operations
  - Gyro-3 mitigations
- Budget
  - Planning to execute to FY24 reductions; monitoring Continuing Resolution/appropriations progress
  - Directed to maintain responsibility for NASA Hubble Fellows Program
  - Ongoing discussions pertaining to the SpaceX re-boost feasibility study

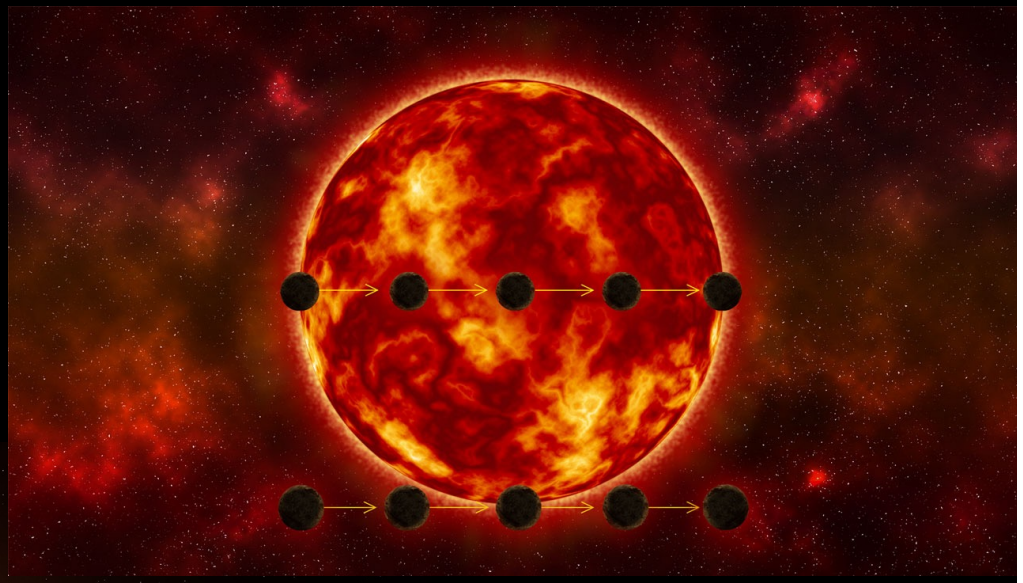
Hubble Is Enabling Powerful Complementary Scientific Return with Other Missions



NASA, ESA, CSA, STScI, Jose M. Diego (IFCA), Jordan C. J. D'Silva (UWA), Anton M. Koekemoer (STScI), Jake Summers (ASU), Rogier Windhorst (ASU), Haojing Yan (University of Missouri)

Exoplanet LTT 1445Ac :

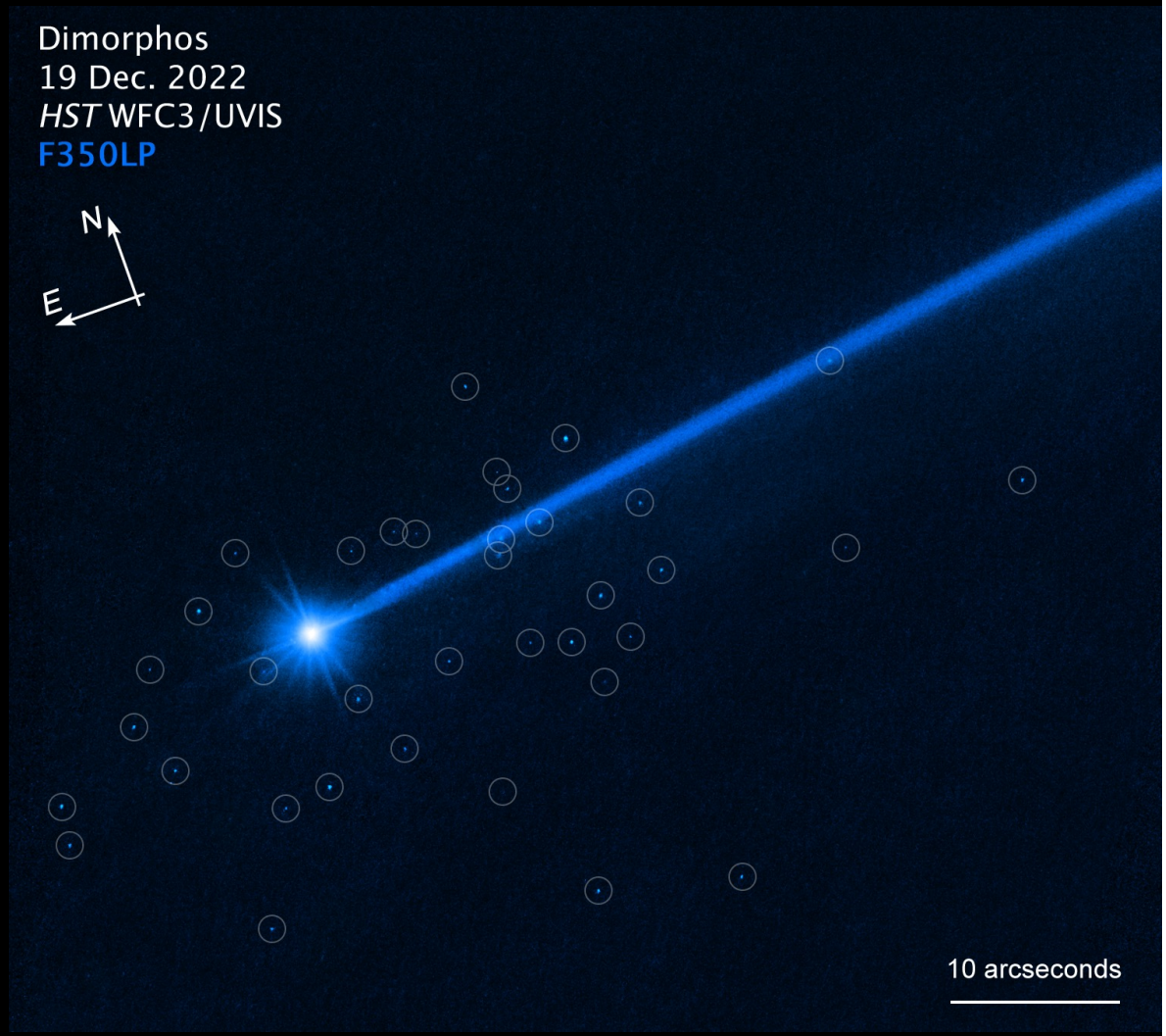
Hubble and TESS



NASA, ESA, STScI, Leah Hustak, Elizabeth Wheatley (STScI)

Asteroid Dimorphos and Boulders:

Hubble and DART



NASA, ESA, David Jewitt (UCLA); APL; Alyssa Pagan (STScI)

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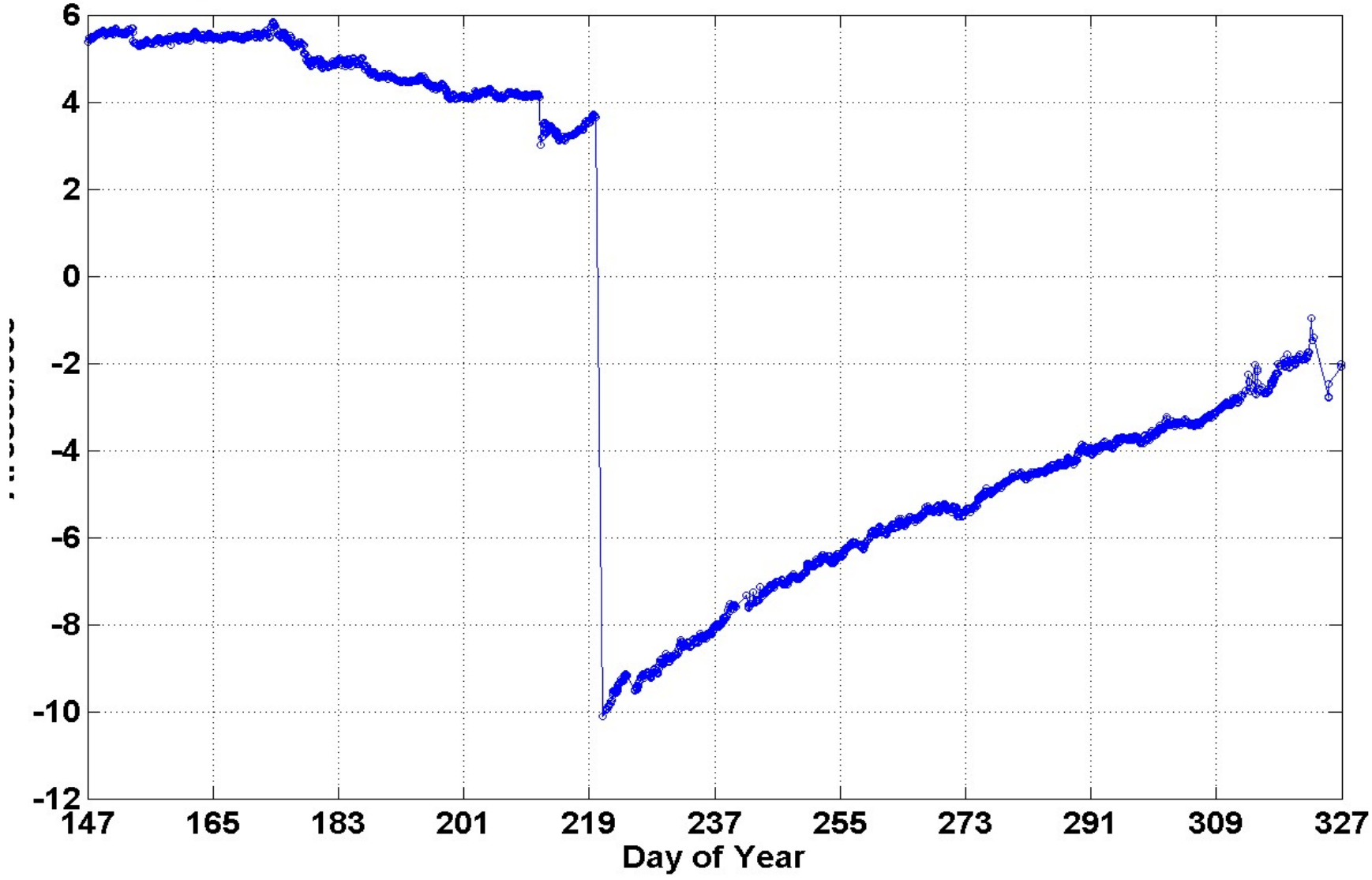
Observatory Status - Gyros

- **Gyro-3 Performance**
  - Large gyro-3 rate bias shift on August 7 and subsequent anomalous rate output on August 12 caused safemode entries
  - Switched to high mode operations; good performance into November
  - Large shifts observed November 9-11; impacted acquisition success rate
  - Larger shifts caused safemode entries November 19, 21, and 23
  - Decided to delay recovery to science operations to enable further characterization of gyro 3 performance, both low and high mode
  - Initial testing began on November 29 and is expected to continue into early December at this time

Observatory Status - Gyros

Gyro 3 Rate Bias - 2023.147 thru 2023.326



Mission Operations – Gyro Run Time Performance

Current Gyro Runtimes

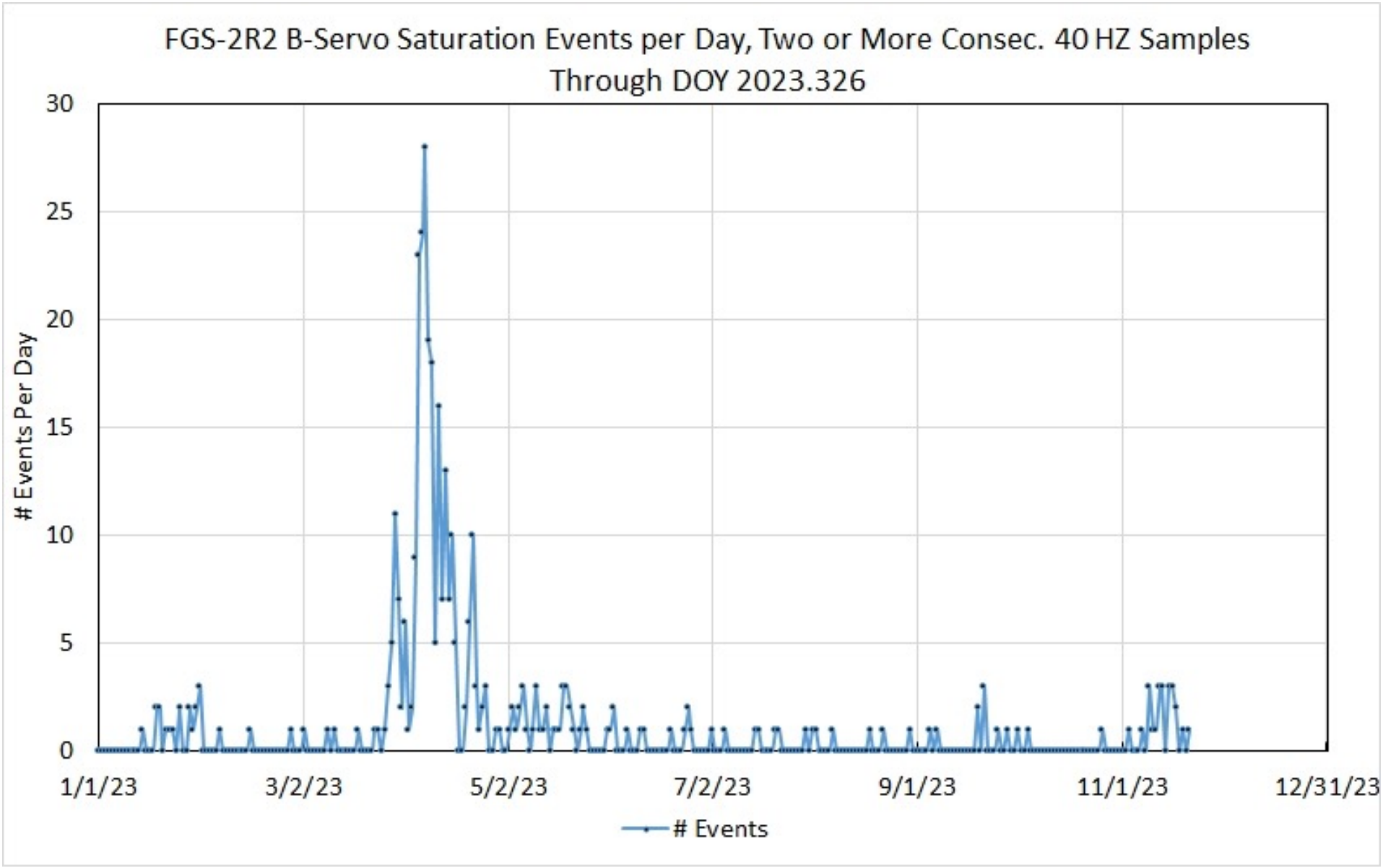
Post SM4 RGA	Status	Flex Lead	Total Hours 2023/304 (10/31/2023)
G1	Failed April 2018	Standard	43,359
G2	Failed October 2018	Standard	47,550
G3	On	Enhanced	66,795
G4	On	Enhanced	137,297
G5	Failed March 2014	Standard	51,497
G6	On	Enhanced	84,411

Previous Flex Lead Failure Runtimes

Date of Failure	Gyro	Flex Lead	Total hours at failure
1992.281	G6	Standard	34825
1997.099	G4	Standard	31525
1998.295	G6	Standard	46276
1999.110	G3	Standard	51252
1999.317	G1	Standard	38470
2007.243	G2	Standard	58039
2014.066	G5	Standard	51497
2018.111	G1	Standard	43359

G4 (Enhanced Flex Lead) – Highest runtime hours on program	137,297
Mean runtime hours for the 3 Enhanced Flex Lead gyros	96,169
G6 (Enhanced Flex Lead) – 2nd highest hours	84,411
G3 (Enhanced Flex Lead) – 3rd highest hours	66,795
4th highest hours (Standard Flex Lead G1 from SM3A)	60,444
Mean runtime hours for all 22 HST gyros	49,674
Mean runtime hours for the 8 HST Standard Flex Lead failure gyros	44,405

Observatory Status
Fine Guidance Sensor 2 Saturation Events



Observatory Status

- **Science Instrument Control and Data Handler**
  - Currently operating on Side-A following the July 2021 side switch recovery
  - Developing approach/implementation plan to enable B-Side Operations if necessary
    - Operations Concept Review held on April 5
    - System Requirements Review held on April 20
    - Subsystem requirements have been reviewed
    - Subsystem Design Reviews underway
    - Overall Critical Design Review expected in Spring 2024 (pending impacts from ongoing operations)

Budget Status

- Post 2022 Senior Review and PPBE-25 (Last Year) expectations
  - FY24 funding: $93.3M
  - NASA Hubble Fellowship Program (annual selection of 24 fellows) would no longer be part of the Hubble Project budget
- Current FY24 expectations:
  - Reduction below $93.3M
  - Retain responsibility for the NHFP
- Preparing options to discuss impacts with NASA HQ
- Expect to substantially reduce General Observer/Archival Research Cycle Value beginning with Cycle 31 (Dec 2023-September 2024)
- Current budget environment is accelerating the timing of Cycle Value reductions that had been forecasted due to the lack of escalation for inflation