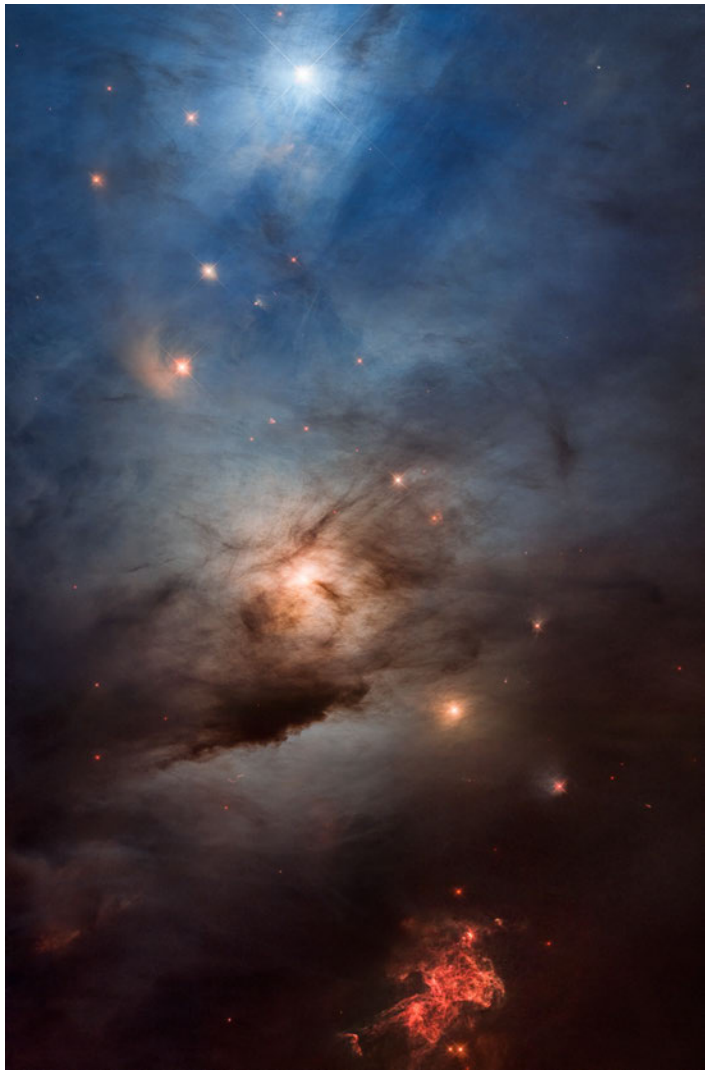
HST/GSFC Project Report



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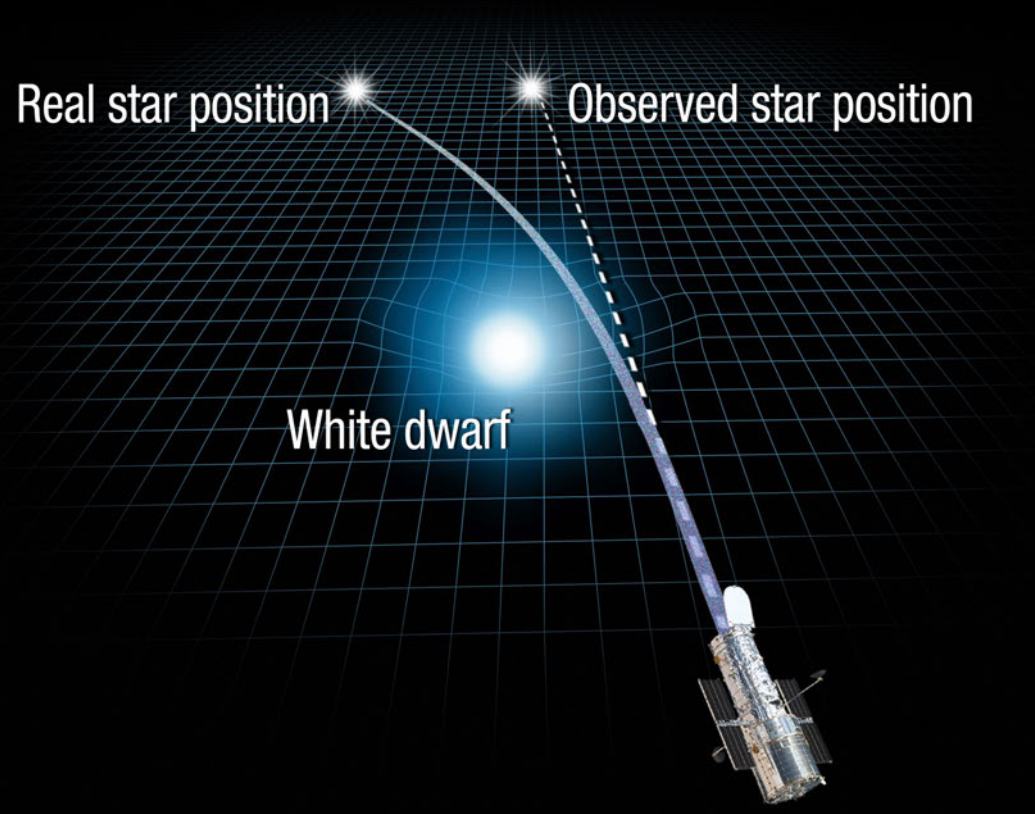
Space Telescope Users Committee Meeting
May 9, 2023

Agenda

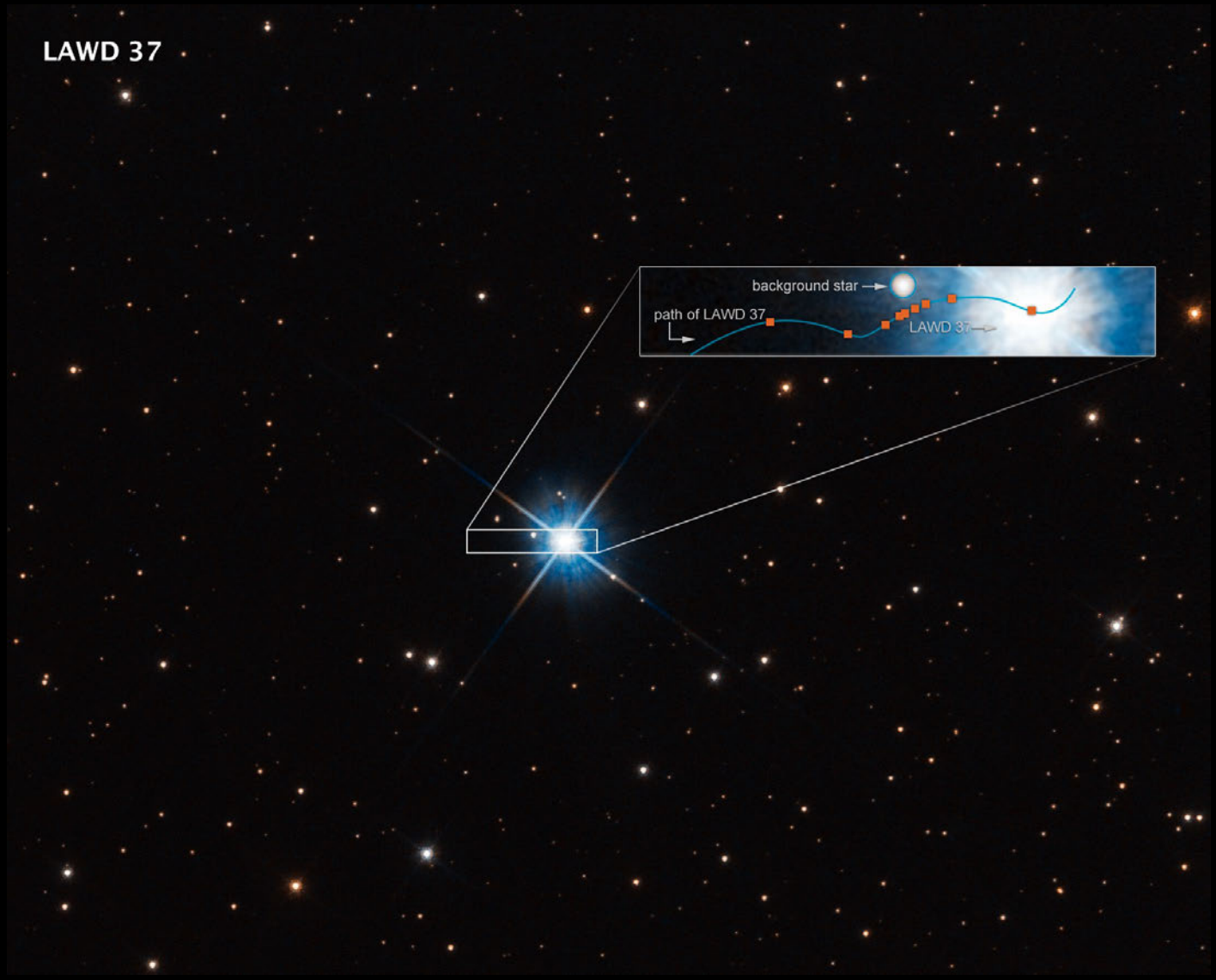
- Science Highlights
- NASA/SpaceX Study
- Observatory Status
  - Fine Guidance Sensor
  - Gyros - Flight Software version 4.8
  - SI C&DH B-Side Operations
- Budget

Hubble measures deflection of starlight by a foreground object



ARTWORK: NASA, ESA, Ann Feild (STScI))

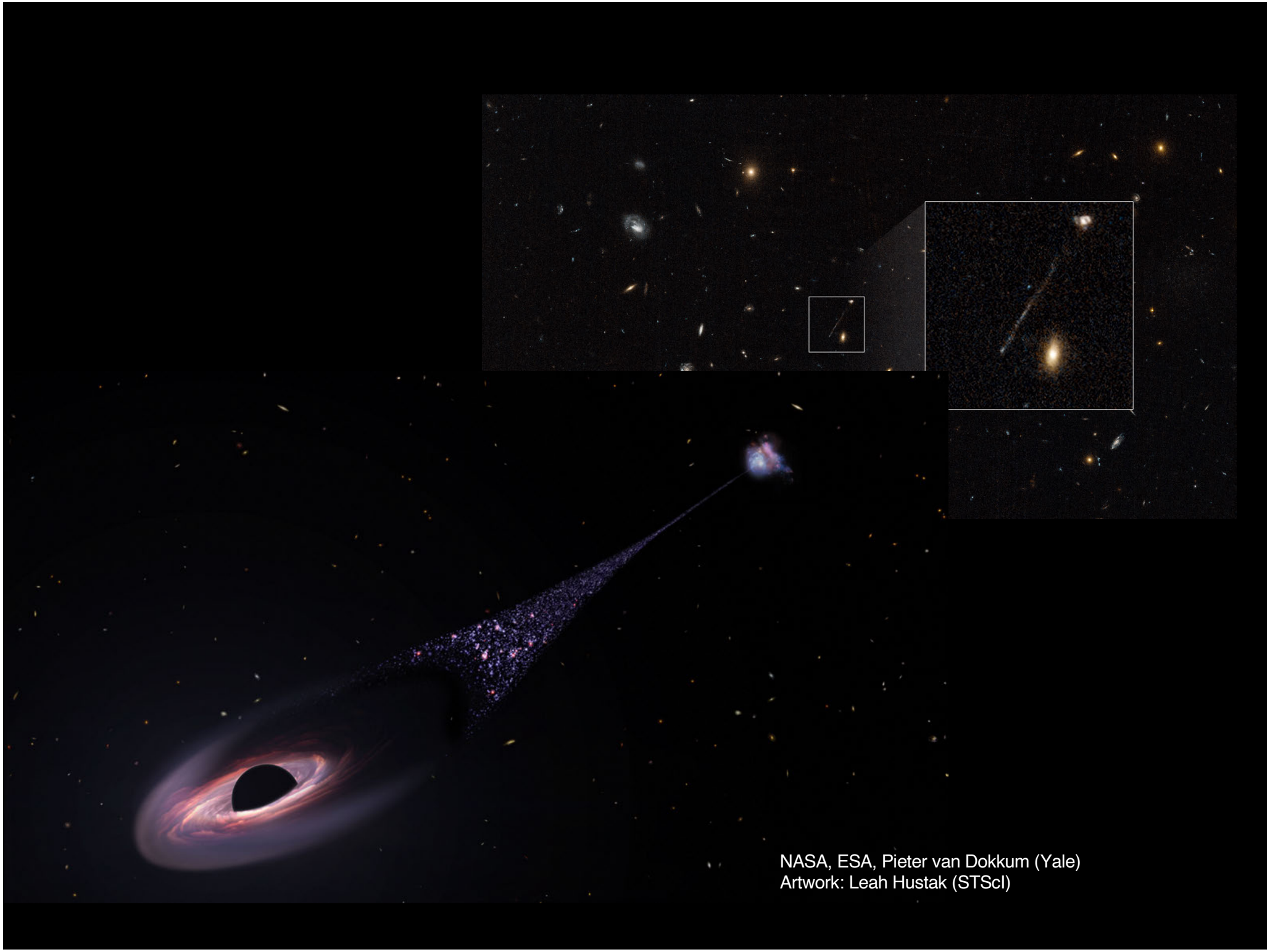
First Mass Measurement of an Isolated White Dwarf



SCIENCE: NASA, ESA, Peter McGill (UC Santa Cruz, IoA), Kailash Sahu (STScI)
IMAGE PROCESSING: Joseph DePasquale (STScI)

HST Surprise: A Runaway Black Hole

SCIENCE: NASA, ESA, Pieter van Dokkum (Yale)
IMAGE PROCESSING: Joseph DePasquale (STScI)



NASA, ESA, Pieter van Dokkum (Yale)
Artwork: Leah Hustak (STScI)

Agenda

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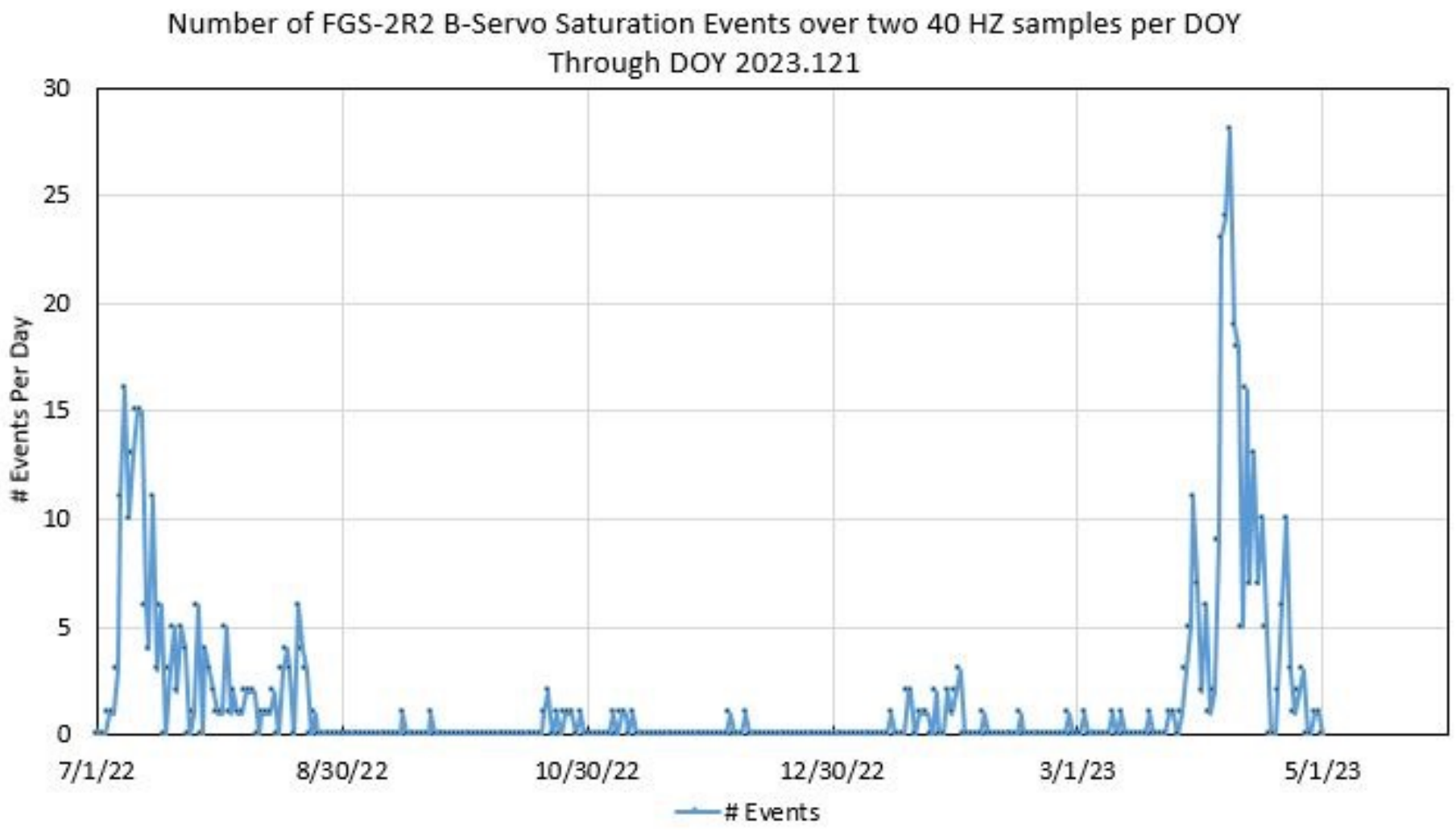
Observatory Status

- **Fine Guidance Sensors**
  - Following recovery from the 2021 SI C&DH Side-B anomaly, FGS-2 has experienced B-servo compensation error voltage saturation and stall events
    - Tiger Team concluded that the stalls were likely due to lubrication/debris on ball bearing or toroid preventing small motion slews as indicated by the compensation error saturating; normal use of the FGS resulted in improved performance
  - FGS-2 period of saturation and stall events since March 28
    - Continued integrated spiral maintenance slews using the Internal Test Source (ITS) to increase the servo motion per Tiger Team discussions
    - Developed dual ITS capability so that it can be used on FGS-1 and 2 simultaneously
    - Performance has significantly improved but not completely back to nominal levels.
  - FGS-1 Servo-B trended back to previous nominal levels.

Observatory Status

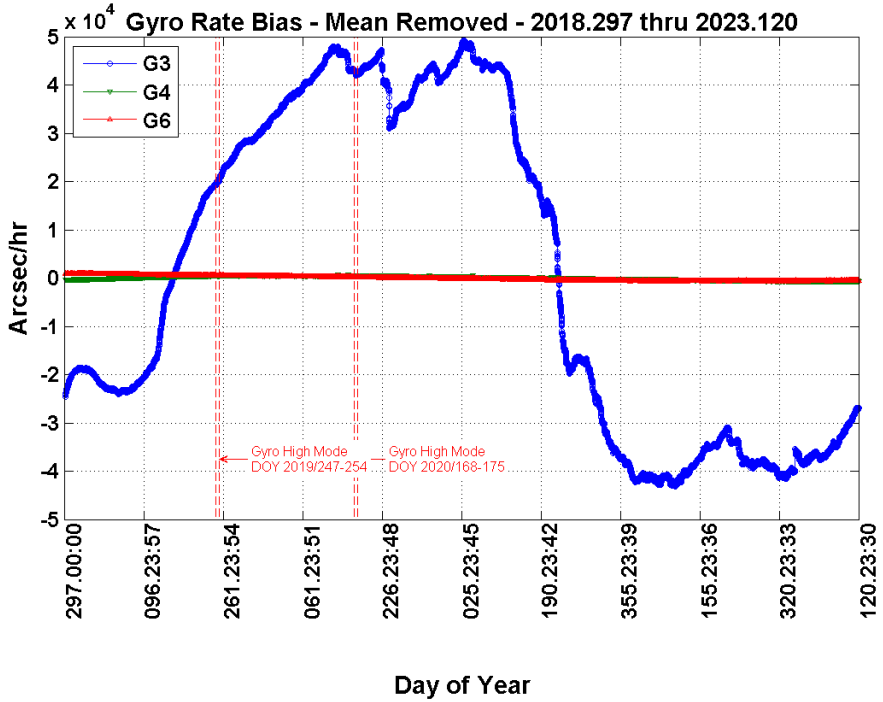
4/30/2023

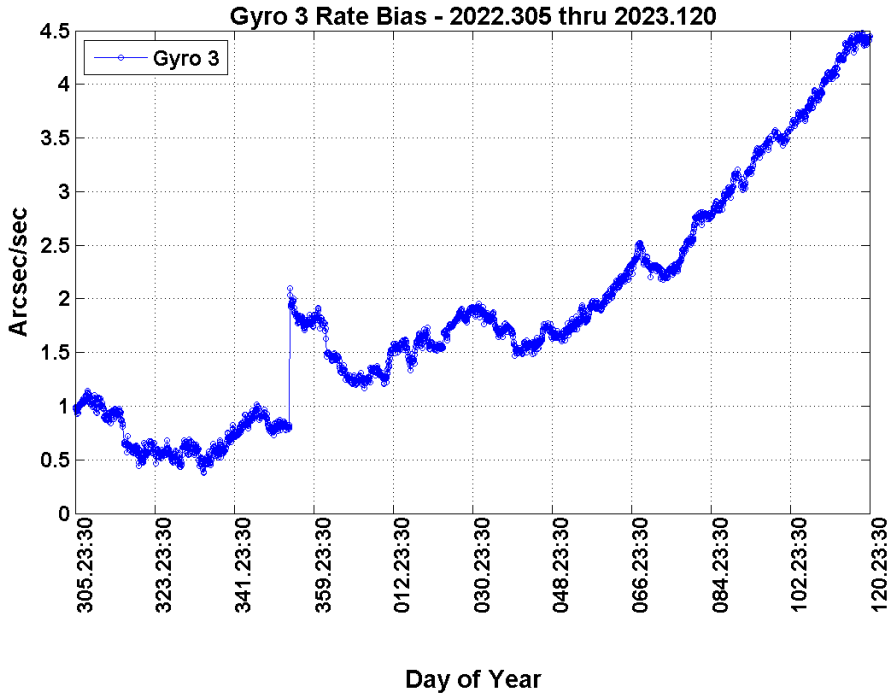


Observatory Status

4/30/2023

- **Gyro-3 Performance**
  - Gyro-3 rate bias remains noisy
  - Ground intervention has not been required since activating the Onboard Bias Estimate capability in flight software version 4.8 on March 30





Mission Operations – Gyro Run Time Performance

Current Gyro Runtimes

Post SM4 RGA	Status	Flex Lead	Total Hours 2023/120 (4/30/2023)
G1	Failed April 2018	Standard	43,359
G2	Failed October 2018	Standard	47,550
G3	On	Enhanced	62,383
G4	On	Enhanced	132,881
G5	Failed March 2014	Standard	51,497
G6	On	Enhanced	79,995

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	132,881
Mean runtime hours for the 3 Enhanced Flex Lead gyros	91,753
G6 (Enhanced Flex Lead) – 2nd highest hours	79,995
G3 (Enhanced Flex Lead) – 3rd highest hours	62,383
4th highest hours (Standard Flex Lead G1 from SM3A)	60,444
Mean runtime hours for all 22 HST gyros	49,072
Mean runtime hours for the 8 HST Standard Flex Lead failure gyros	44,405

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**
    - **Critical Design Review expected in August**
    - **Working implementation schedule**

Budget Status

FY22	FY23	FY24	FY25	FY26	FY27	FY28	FY29
$98.3	$93.3	$93.3	$98.3	$98.3	$98.3	$98.3	$98.3

- President's Budget Request for FY24 included $5M reduction
  - Impacts included in PPBE-25 discussion with HQ on April 17
  - Expect to support Hubble program without impact through 2025
  - Reductions to the General Observer/Archival Research (GO/AR) science research support will be required
- Cycle 30 (Oct 2022-November 2023) - $35.8M
- Expect to fully support the Financial Review Committee recommendations for the Cycle 31 (Dec 2023-September 2024) and Cycle 32 (FY25)
- Cycle 33 and beyond (FY26-FY29)
  - Cycle Values will decrease beginning in FY26 within the current budget guidance due to the lack of escalation to offset inflation
  - ~40% reductions by FY29 are likely
  - Senior Review 2025 will revisit FY26-30 budget guidance