# 17812 - Unraveling a Decades-long mystery: Identifying the Atmospheric and Magnetospheric Drivers of the Jovian Hydrogen Ly-alpha Bulge

Cycle: 32, Proposal Category: GO

(UV Initiative)

(Availability Mode: AVAILABLE)

**INVESTIGATORS**

| *Name* | *Institution* |
|---|---|
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| Dr. G. Randall Gladstone (CoI) | Southwest Research Institute |
| Dr. Luke Moore (CoI) | Boston University |
| Dr. Caitriona M. Jackman (CoI) (ESA Member) | Dublin Institute For Advanced Studies |

**VISITS**

| *Visit* | *Targets used in Visit* | *Configurations used in Visit* | *Orbits Used* | *Last Orbit Planner Run* | *OP Current with Visit?* |
|---|---|---|---|---|---|
| 01 | (1) JUPITER-H-BULGE-030 | STIS/FUV-MAMA | 1 | 15-Aug-2025 13:00:29.0 | yes |
| 02 | (2) JUPITER-H-BULGE-050 | STIS/FUV-MAMA | 1 | 15-Aug-2025 13:00:30.0 | yes |
| 03 | (3) JUPITER-H-BULGE-070 | STIS/FUV-MAMA | 1 | 15-Aug-2025 13:00:30.0 | yes |
| 04 | (4) JUPITER-H-BULGE-090<br>(8) CALIBRATION | STIS/FUV-MAMA | 2 | 15-Aug-2025 13:00:31.0 | yes |
| 05 | (5) JUPITER-H-BULGE-110 | STIS/FUV-MAMA | 1 | 15-Aug-2025 13:00:31.0 | yes |
| 06 | (6) JUPITER-H-BULGE-130 | STIS/FUV-MAMA | 1 | 15-Aug-2025 13:00:31.0 | yes |

| *Visit* | *Targets used in Visit* | *Configurations used in Visit* | *Orbits Used* | *Last Orbit Planner Run* | *OP Current with Visit?* |
|---|---|---|---|---|---|
| 07 | (7) JUPITER-H-BULGE-150 | STIS/FUV-MAMA | 1 | 15-Aug-2025 13:00:32.0 | yes |

8 Total Orbits Used

**ABSTRACT**

Jupiter's low-latitude ultraviolet emission is dominated by an unexplained feature which must be fundamentally connected to both the planet's atmosphere and magnetic field: the hydrogen Lyman-a (H Ly-a) bulge. The bulge is an increase in H Ly-a emission near magnetic longitudes of 100 deg., and is unique among such emission features for being fixed in longitude, rather than with respect to the Sun. Decades after its discovery, the physical processes driving the bulge remain a mystery. While many processes have been put forth to explain it, observations have so far been unable to distinguish between these. Presently, the best clues we have are two other curious structures colocated in magnetic longitude: an unusual equatorial magnetic anomaly discovered with Juno (the 'Great Blue Spot') and a dimming of ionospheric infrared emission. The physical underpinnings of the bulge and its connections to these nearby structures are key to understanding how Jupiter's equatorial ionosphere and inner magnetosphere interact. This interaction is fundamental to answering several open questions at Jupiter: How similar, or different, is Jupiter's equatorial interaction with the space environment to the Earth's? How does energy propagate through Jupiter's upper atmosphere? How do heavy ions populate Jupiter's radiation belts? Answering these questions has broad implications for the understanding the interactions between atmospheres and magnetic fields at all planets, including the Earth, Saturn, the ice giants, and exoplanets. The high spectral and spatial resolution observations required to finally understand the H bulge are possible only with HST. This program supports the UV initiative.

**OBSERVING DESCRIPTION**

To fully characterize Jupiter's low-latitude UV emissions near the H Lyman-a Bulge, we will take 8 observations in 8 orbits, consisting of 7 science observations and 1 calibration. The 7 science observations will be 45 min. TIMETAG exposures targeting the System III (SIII) planetographic longitudes 30D, 50D, 70D, 90D, 110D, 130D, and 150D, centered 10D north of the rotational equator near-bulge magnetic equator latitudes (i.e., at planetographic latitudes of 10D). These observations will be taken with the STIS/FUV-MAMA E140H echelle grating and the 52"x0.5" aperture. High spatial resolution in planetogaphic longitude will be achieved by sub-integrating the TIMETAG observations; during each 45 min. exposure, the planet will rotate approximately 27 degrees under the fixed slit. Resolution in latitude will be determined by both the HST ORIENT angle (+U3 position angle) and Jovian north pole position angle at the time of the observation; ORIENT angles which provide the needed latitudinal coverage (-15D - 30D planetographic latitude) will be specified for each visit. The E140H grating with a center wavelength of 1234 A gives a spectral resolution of 0.06 A FWHM in practice, or R=20,000. No other configuration of HST is sensitive enough to make the required observations.

Observation of the target longitudes may begin within a +/-5D window for flexibility in scheduling; overlap between observed regions would be beneficial to aligning observations, but is not required. For further flexibility, target longitudes may be observed up to +30D from CML as the Earth approaches Jupiter, or -30D from CML as the Earth moves away, to preserve the Doppler shift of the Jovian H Ly-alpha. The FUV-MAMA spectroscopic observations must be scheduled to avoid the South Atlantic Anomaly (SAA), yielding a nominal 5 orbits/day. There is no requirement that the 7 science observations occur near one another in time due to the slowly-changing nature of the H Bulge. SAA-affected orbits will thus be skipped with the next orbit coinciding with an unobserved longitude used instead.

These observations will be taken at times when Jupiter is >90D away from the Sun, allowing adequate off-nominal roll, and the absolute Earth-Jupiter speed is greater than the 15 km/s needed to Doppler shift the Jovian H Ly-alpha emission line off geocoronal emission by 0.06 A.

## Visit

**Proposal 17812, H-Bulge-030 (01), implementation** Fri Aug 15 17:00:32 GMT 2025

**Diagnostic Status: Warning**

Scientific Instruments: STIS/FUV-MAMA

Special Requirements: PCS MODE FINE; ORIENT 13D TO 102 D; ORIENT 193D TO 282 D; BETWEEN 03-SEP-2025 AND 25-NOV-2025; BETWEEN 22-FEB-2026 AND 24-MAY-2026

*Comments: Orientation requirements were calculated to achieve the minimum required latitudinal coverage (-15 - 30 degrees latitude) on the planet's surface, assuming the long axis of the slit is positioned -45D East of North (counterclockwise) from the HST/STIS U3 axis.*

*As the latitudinal coverage is related to the angular diameter and north pole position angle (NPPA) of the planet, the allowable orientation angles change with time. Acceptable orient ranges for the period 03-SEP-2025 -- 25-NOV-2025 have been added below.*
**** If using the second date range, please contact for revised orient ranges!****

*There is no required order for the visits (and no hold is required), but completing all visits within a shorter amount of time (~1 month) is preferred.*

## Diagnostics

(H-Bulge-030 (01)) Warning (Form): A target acquisition should probably be performed before doing spectroscopy or coronography with STIS or COS.

(H-Bulge-030 (01)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(H-Bulge-030 (01)) Warning (Orbit Planner): STIS SCIENCE TOO FAR FROM WAVECAL

(H-Bulge-030 (01)) Informational (Form): The Visit Planner and Spike may produce different schedulability results.

## Solar System Targets

| # | Name | Level 1 | Level 2 | Level 3 | Window | Ephem Center |
|---|---|---|---|---|---|---|
| (1) | JUPITER-H-BULGE-030 | STD=JUPITER | TYPE=PGRAPHIC,LONG=30,LAT=10 | | NOT OCC OF JUPITER-H-BULGE-030 BY JUPITER FROM EARTH, NOT ECL P PARTIAL OF JUPITER-H-BULGE-030 BY IO FROM EARTH, NOT ECL P PARTIAL OF JUPITER-H-BULGE-030 BY EUROPA FROM EARTH, NOT ECL P PARTIAL OF JUPITER-H-BULGE-030 BY GANYMEDE FROM EARTH, NOT ECL P PARTIAL OF JUPITER-H-BULGE-030 BY CALLISTO FROM EARTH, SEP OF JUPITER-H-BULGE-030 IO FROM EARTH GT 10", SEP OF JUPITER-H-BULGE-030 EUROPA FROM EARTH GT 10", SEP OF JUPITER-H-BULGE-030 GANYMEDE FROM EARTH GT 10", SEP OF JUPITER-H-BULGE-030 CALLISTO FROM EARTH GT 10", CML OF JUPITER FROM EARTH BETWEEN 0 60 | EARTH |

*Comments: "Default Window" constraints regarding moon occultations can be removed, if necessary for schedulability.*
*Description=FEATURE JUPITER*
*Extended=YES*

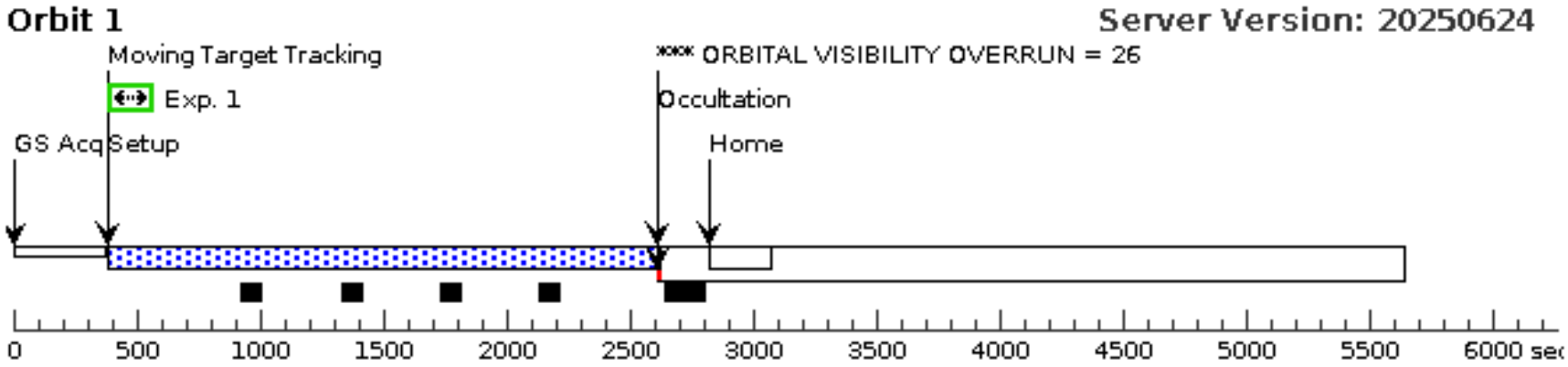
## Exposures

| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 030 (STIS.sp.1937593) | (1) JUPITER-H-BULGE-030 | STIS/FUV-MAMA, TIME-TAG, 52X0.5 | E140H 1234 A | BUFFER-TIME=400; WAVECAL=NO | | | 2700 Secs (2087 Secs)<br>*[==>2087.0 Secs ]* | <br>***[1]*** |

*Comments: ETC Run has H Ly-alpha flux increased be 10x, as the 52"x0.05" slit available is 10x smaller than the 52"x0.5". The ETC-predicted count/s should thus be accurate.*

*WAVECAL=NO set to maximize observation exposure time. WAVECAL can be scheduled outside visibility period, but could not be scheduled in APT as the aperture-grating combination is not supported (but is available).*

Orbit Structure



## Visit

**Proposal 17812, H-Bulge-050 (02), implementation** Fri Aug 15 17:00:32 GMT 2025

**Diagnostic Status: Warning**

Scientific Instruments: STIS/FUV-MAMA

Special Requirements: ORIENT 13D TO 102 D; ORIENT 193D TO 282 D; BETWEEN 19-JAN-2025 AND 19-APR-2025; BETWEEN 03-SEP-2025 AND 25-NOV-2025; BETWEEN 22-FEB-2026 AND 24-MAY-2026

*Comments: Orientation requirements were calculated to achieve the minimum required latitudinal coverage (-15 - 30 degrees latitude) on the planet's surface, assuming the long axis of the slit is positioned -45D East of North (counterclockwise) from the HST/STIS U3 axis.*

*As the latitudinal coverage is related to the angular diameter and north pole position angle (NPPA) of the planet, the allowable orientation angles change with time. Acceptable orient ranges for the period 03-SEP-2025 -- 25-NOV-2025 have been added below.*
**** If using the second date range, please contact for revised orient ranges!****

*There is no required order for the visits (and no hold is required), but completing all visits within a shorter amount of time (~1 month) is preferred.*

## Diagnostics

(H-Bulge-050 (02)) Warning (Form): A target acquisition should probably be performed before doing spectroscopy or coronography with STIS or COS.

(H-Bulge-050 (02)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(H-Bulge-050 (02)) Warning (Orbit Planner): STIS SCIENCE TOO FAR FROM WAVECAL

(H-Bulge-050 (02)) Informational (Form): The Visit Planner and Spike may produce different schedulability results.

## Solar System Targets

| # | Name | Level 1 | Level 2 | Level 3 | Window | Ephem Center |
|---|---|---|---|---|---|---|
| (2) | JUPITER-H-BULGE-050 | STD=JUPITER | TYPE=PGRAPHIC,LONG=50,LAT=10 | | NOT OCC OF JUPITER-H-BULGE-050 BY JUPITER FROM EARTH, NOT ECL P PARTIAL OF JUPITER-H-BULGE-050 BY IO FROM EARTH, NOT ECL P PARTIAL OF JUPITER-H-BULGE-050 BY EUROPA FROM EARTH, NOT ECL P PARTIAL OF JUPITER-H-BULGE-050 BY GANYMEDE FROM EARTH, NOT ECL P PARTIAL OF JUPITER-H-BULGE-050 BY CALLISTO FROM EARTH, SEP OF JUPITER-H-BULGE-050 IO FROM EARTH GT 10", SEP OF JUPITER-H-BULGE-050 EUROPA FROM EARTH GT 10", SEP OF JUPITER-H-BULGE-050 GANYMEDE FROM EARTH GT 10", SEP OF JUPITER-H-BULGE-050 CALLISTO FROM EARTH GT 10", CML OF JUPITER FROM EARTH BETWEEN 20 80 | EARTH |

*Comments: "Default Window" constraints regarding moon occultations can be removed, if necessary for schedulability.*
*Description=FEATURE JUPITER*
*Extended=YES*

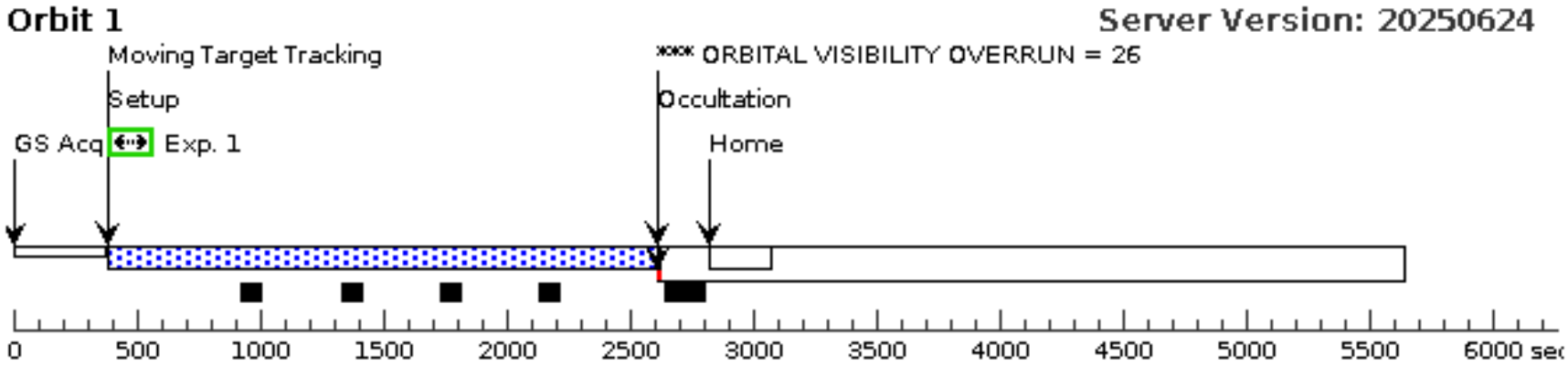
## Exposures

| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 050 (STIS.sp.1937593) | (2) JUPITER-H-BULGE-050 | STIS/FUV-MAMA, TIME-TAG, 52X0.5 | E140H 1234 A | BUFFER-TIME=400; WAVECAL=NO | | | 2700 Secs (2087 Secs)<br>*[==>2087.0 Secs ]* | <br>***[1]*** |

*Comments: ETC Run has H Ly-alpha flux increased be 10x, as the 52"x0.05" slit available is 10x smaller than the 52"x0.5". The ETC-predicted count/s should thus be accurate.*

*WAVECAL=NO set to maximize observation exposure time; WAVECAL can be scheduled outside visibility period.*

Orbit Structure



## Visit

**Proposal 17812, H-Bulge-070 (03), implementation** Fri Aug 15 17:00:32 GMT 2025

**Diagnostic Status: Warning**

Scientific Instruments: STIS/FUV-MAMA

Special Requirements: ORIENT 13D TO 102 D; ORIENT 193D TO 282 D; BETWEEN 19-JAN-2025 AND 19-APR-2025; BETWEEN 03-SEP-2025 AND 25-NOV-2025; BETWEEN 22-FEB-2026 AND 24-MAY-2026

*Comments: Orientation requirements were calculated to achieve the minimum required latitudinal coverage (-15 - 30 degrees latitude) on the planet's surface, assuming the long axis of the slit is positioned -45D East of North (counterclockwise) from the HST/STIS U3 axis.*

*As the latitudinal coverage is related to the angular diameter and north pole position angle (NPPA) of the planet, the allowable orientation angles change with time. Acceptable orient ranges for the period 03-SEP-2025 -- 25-NOV-2025 have been added below.*
**** If using the second date range, please contact for revised orient ranges!****

*There is no required order for the visits (and no hold is required), but completing all visits within a shorter amount of time (~1 month) is preferred.*

## Diagnostics

(H-Bulge-070 (03)) Warning (Form): A target acquisition should probably be performed before doing spectroscopy or coronography with STIS or COS.

(H-Bulge-070 (03)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(H-Bulge-070 (03)) Warning (Orbit Planner): STIS SCIENCE TOO FAR FROM WAVECAL

(H-Bulge-070 (03)) Informational (Form): The Visit Planner and Spike may produce different schedulability results.

## Solar System Targets

| # | Name | Level 1 | Level 2 | Level 3 | Window | Ephem Center |
|---|---|---|---|---|---|---|
| (3) | JUPITER-H-BULGE-070 | STD=JUPITER | TYPE=PGRAPHIC,LONG=70,LAT=10 | | NOT OCC OF JUPITER-H-BULGE-070 BY JUPITER FROM EARTH, NOT ECL P PARTIAL OF JUPITER-H-BULGE-070 BY IO FROM EARTH, NOT ECL P PARTIAL OF JUPITER-H-BULGE-070 BY EUROPA FROM EARTH, NOT ECL P PARTIAL OF JUPITER-H-BULGE-070 BY GANYMEDE FROM EARTH, NOT ECL P PARTIAL OF JUPITER-H-BULGE-070 BY CALLISTO FROM EARTH, SEP OF JUPITER-H-BULGE-070 IO FROM EARTH GT 10", SEP OF JUPITER-H-BULGE-070 EUROPA FROM EARTH GT 10", SEP OF JUPITER-H-BULGE-070 GANYMEDE FROM EARTH GT 10", SEP OF JUPITER-H-BULGE-070 CALLISTO FROM EARTH GT 10", CML OF JUPITER FROM EARTH BETWEEN 40 100 | EARTH |

*Comments: "Default Window" constraints regarding moon occultations can be removed, if necessary for schedulability.*
*Description=FEATURE JUPITER*
*Extended=YES*

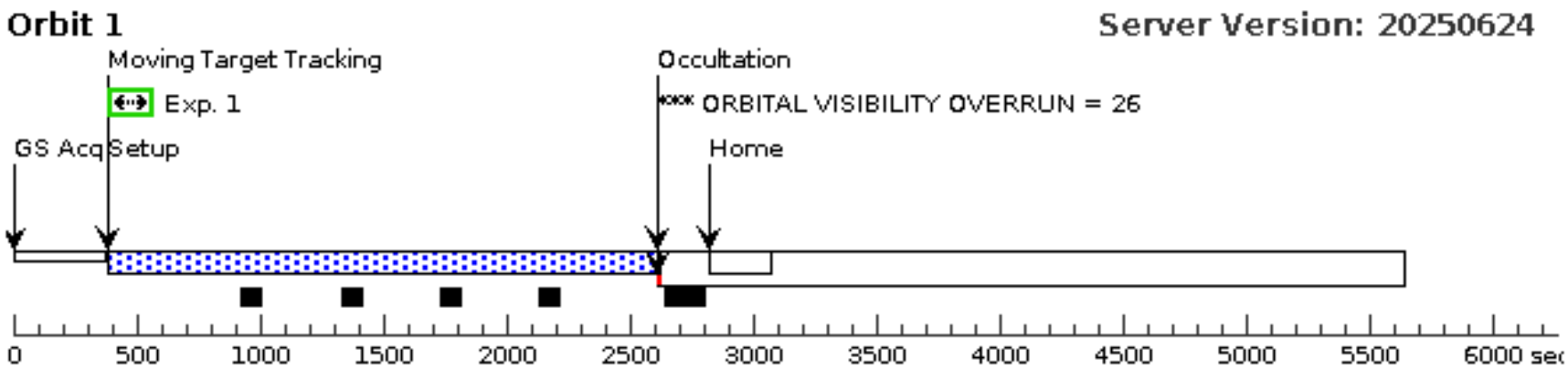
## Exposures

| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 070 (STIS.sp.1937593) | (3) JUPITER-H-BULGE-070 | STIS/FUV-MAMA, TIME-TAG, 52X0.5 | E140H 1234 A | BUFFER-TIME=400; WAVECAL=NO | | | 2700 Secs (2087 Secs)<br>*[==>2087.0 Secs ]* | <br>***[1]*** |

*Comments: ETC Run has H Ly-alpha flux increased be 10x, as the 52"x0.05" slit available is 10x smaller than the 52"x0.5". The ETC-predicted count/s should thus be accurate.*

*WAVECAL=NO set to maximize observation exposure time; WAVECAL can be scheduled outside visibility period.*

Orbit Structure



| | |
|---|---|
| **Visit** | **Proposal 17812, H-Bulge-090 (04), implementation** Fri Aug 15 17:00:32 GMT 2025<br>**Diagnostic Status: Warning**<br>Scientific Instruments: STIS/FUV-MAMA<br>Special Requirements: ORIENT 13D TO 102 D; ORIENT 193D TO 282 D; BETWEEN 19-JAN-2025 AND 19-APR-2025; BETWEEN 03-SEP-2025 AND 25-NOV-2025; BETWEEN 22-FEB-2026 AND 24-MAY-2026<br>*Comments: Orientation requirements were calculated to achieve the minimum required latitudinal coverage (-15 - 30 degrees latitude) on the planet's surface, assuming the long axis of the slit is positioned -45D East of North (counterclockwise) from the HST/STIS U3 axis.*<br>*As the latitudinal coverage is related to the angular diameter and north pole position angle (NPPA) of the planet, the allowable orientation angles change with time. Acceptable orient ranges for the period 03-SEP-2025 -- 25-NOV-2025 have been added below.*<br>**** If using the second date range, please contact for revised orient ranges!****<br>*There is no required order for the visits (and no hold is required), but completing all visits within a shorter amount of time (~1 month) is preferred.* |
| **Diagnostics** | (H-Bulge-090 (04)) Warning (Form): A target acquisition should probably be performed before doing spectroscopy or coronography with STIS or COS.<br>(H-Bulge-090 (04)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN<br>(H-Bulge-090 (04)) Warning (Orbit Planner): STIS SCIENCE TOO FAR FROM WAVECAL<br>(H-Bulge-090 (04)) Warning (Orbit Planner): STIS SCIENCE TOO FAR FROM WAVECAL<br>(H-Bulge-090 (04)) Informational (Form): The Visit Planner and Spike may produce different schedulability results. |

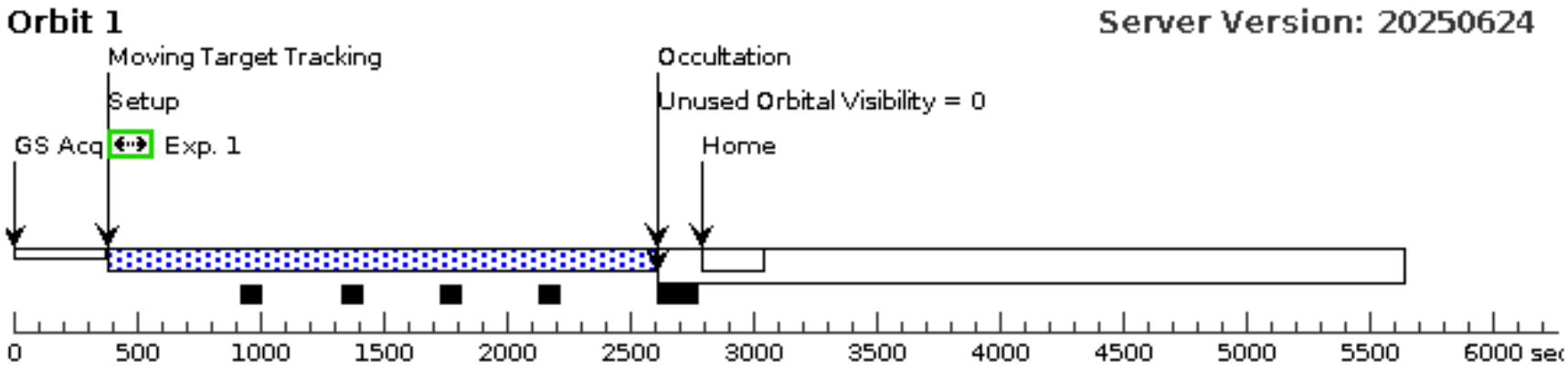
**Solar System Targets**

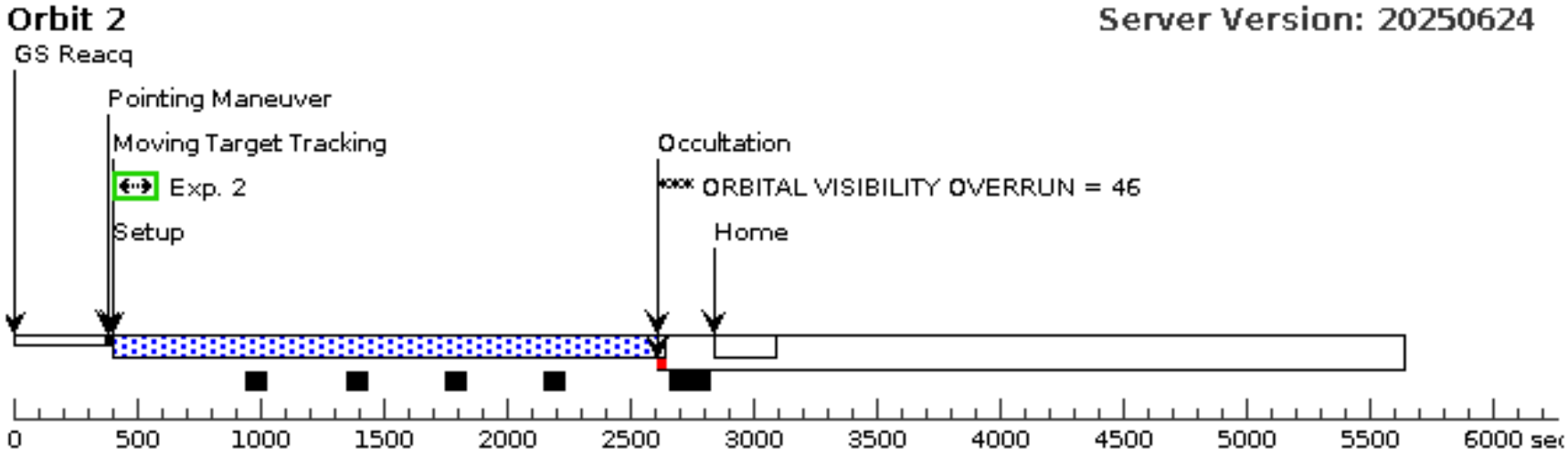
| # | Name | Level 1 | Level 2 | Level 3 | Window | Ephem Center |
|---|---|---|---|---|---|---|
| (4) | JUPITER-H-BULGE-090 | STD=JUPITER | TYPE=PGRAPHIC,LONG=90,LAT=10 | | NOT OCC OF JUPITER-H-BULGE-090 BY JUPITER FROM EARTH, NOT ECL P PARTIAL OF JUPITER-H-BULGE-090 BY IO FROM EARTH, NOT ECL P PARTIAL OF JUPITER-H-BULGE-090 BY EUROPA FROM EARTH, NOT ECL P PARTIAL OF JUPITER-H-BULGE-090 BY GANYMEDE FROM EARTH, NOT ECL P PARTIAL OF JUPITER-H-BULGE-090 BY CALLISTO FROM EARTH, SEP OF JUPITER-H-BULGE-090 IO FROM EARTH GT 10", SEP OF JUPITER-H-BULGE-090 EUROPA FROM EARTH GT 10", SEP OF JUPITER-H-BULGE-090 GANYMEDE FROM EARTH GT 10", SEP OF JUPITER-H-BULGE-090 CALLISTO FROM EARTH GT 10", CML OF JUPITER FROM EARTH BETWEEN 60 120 | EARTH |
| *Comments: "Default Window" constraints regarding moon occultations can be removed, if necessary for schedulability.*<br>*Description=FEATURE JUPITER*<br>*Extended=YES* | | | | | | |
| (8) | CALIBRATION | STD=JUPITER | TYPE=POS_ANGLE,RAD=300,ANG=180,REF=SUN | | NOT OCC OF CALIBRATION BY JUPITER FROM EARTH, NOT ECL P PARTIAL OF CALIBRATION BY IO FROM EARTH, NOT ECL P PARTIAL OF CALIBRATION BY EUROPA FROM EARTH, NOT ECL P PARTIAL OF CALIBRATION BY GANYMEDE FROM EARTH, NOT ECL P PARTIAL OF CALIBRATION BY CALLISTO FROM EARTH, SEP OF CALIBRATION IO FROM EARTH GT 10", SEP OF CALIBRATION EUROPA FROM EARTH GT 10", SEP OF CALIBRATION GANYMEDE FROM EARTH GT 10", SEP OF CALIBRATION CALLISTO FROM EARTH GT 10" | EARTH |
| *Comments: "Default Window" constraints regarding moon occultations can be removed, if necessary for schedulability.*<br>*Description=OFFSET JUPITER*<br>*Extended=YES* | | | | | | |

## Exposures

| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 090 (STIS.sp.1937593) | (4) JUPITER-H-BULGE-090 | STIS/FUV-MAMA, TIME-TAG, 52X0.5 | E140H 1234 A | BUFFER-TIME=400; WAVECAL=NO | | | 2700 Secs (2061 Secs) *[==>2061.0 Secs ]* | *[1]* |
| | *Comments: ETC Run has H Ly-alpha flux increased be 10x, as the 52"x0.05" slit available is 10x smaller than the 52"x0.5". The ETC-predicted count/s should thus be accurate.* | | | | | | | | |
| | *WAVECAL=NO set to maximize observation exposure time; WAVECAL can be scheduled outside visibility period.* | | | | | | | | |
| 2 | Calibration (STIS.sp.1937593) | (8) CALIBRATION | STIS/FUV-MAMA, TIME-TAG, 52X0.5 | E140H 1234 A | BUFFER-TIME=400; WAVECAL=NO | | | 2700 Secs (2087 Secs) *[==>2087.0 Secs ]* | *[2]* |
| | *Comments: WAVECAL=NO set to maximize observation exposure time; WAVECAL can be scheduled outside visibility period.* | | | | | | | | |

## Orbit Structure



## Visit

**Proposal 17812, H-Bulge-110 (05), implementation** Fri Aug 15 17:00:32 GMT 2025

**Diagnostic Status: Warning**

Scientific Instruments: STIS/FUV-MAMA

Special Requirements: ORIENT 13D TO 102 D; ORIENT 193D TO 282 D; BETWEEN 19-JAN-2025 AND 19-APR-2025; BETWEEN 03-SEP-2025 AND 25-NOV-2025; BETWEEN 22-FEB-2026 AND 24-MAY-2026

*Comments: Orientation requirements were calculated to achieve the minimum required latitudinal coverage (-15 - 30 degrees latitude) on the planet's surface, assuming the long axis of the slit is positioned -45D East of North (counterclockwise) from the HST/STIS U3 axis.*

*As the latitudinal coverage is related to the angular diameter and north pole position angle (NPPA) of the planet, the allowable orientation angles change with time. Acceptable orient ranges for the period 03-SEP-2025 -- 25-NOV-2025 have been added below.*
**** If using the second date range, please contact for revised orient ranges!****

*There is no required order for the visits (and no hold is required), but completing all visits within a shorter amount of time (~1 month) is preferred.*

## Diagnostics

(H-Bulge-110 (05)) Warning (Form): A target acquisition should probably be performed before doing spectroscopy or coronography with STIS or COS.

(H-Bulge-110 (05)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(H-Bulge-110 (05)) Warning (Orbit Planner): STIS SCIENCE TOO FAR FROM WAVECAL

(H-Bulge-110 (05)) Informational (Form): The Visit Planner and Spike may produce different schedulability results.

## Solar System Targets

| # | Name | Level 1 | Level 2 | Level 3 | Window | Ephem Center |
|---|---|---|---|---|---|---|
| (5) | JUPITER-H-BULGE-110 | STD=JUPITER | TYPE=PGRAPHIC,LONG=110,LAT=10 | | NOT OCC OF JUPITER-H-BULGE-110 BY JUPITER FROM EARTH, NOT ECL P PARTIAL OF JUPITER-H-BULGE-110 BY IO FROM EARTH, NOT ECL P PARTIAL OF JUPITER-H-BULGE-110 BY EUROPA FROM EARTH, NOT ECL P PARTIAL OF JUPITER-H-BULGE-110 BY GANYMEDE FROM EARTH, NOT ECL P PARTIAL OF JUPITER-H-BULGE-110 BY CALLISTO FROM EARTH, SEP OF JUPITER-H-BULGE-110 IO FROM EARTH GT 10", SEP OF JUPITER-H-BULGE-110 EUROPA FROM EARTH GT 10", SEP OF JUPITER-H-BULGE-110 GANYMEDE FROM EARTH GT 10", SEP OF JUPITER-H-BULGE-110 CALLISTO FROM EARTH GT 10", CML OF JUPITER FROM EARTH BETWEEN 80 140 | EARTH |

*Comments: "Default Window" constraints regarding moon occultations can be removed, if necessary for schedulability.*
*Description=FEATURE JUPITER*
*Extended=YES*

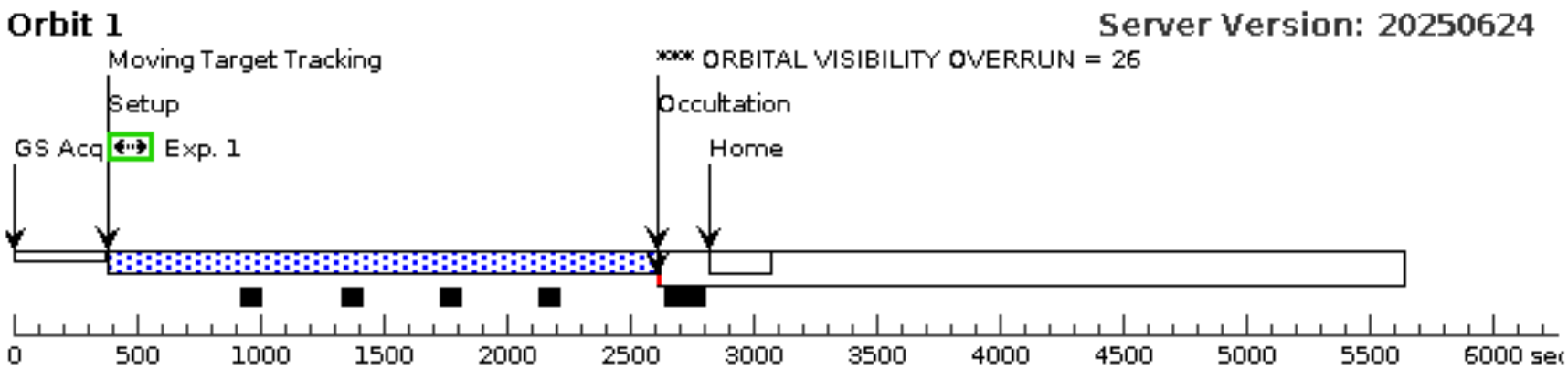
## Exposures

| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 110 (STIS.sp.1937593) | (5) JUPITER-H-BULGE-110 | STIS/FUV-MAMA, TIME-TAG, 52X0.5 | E140H 1234 A | BUFFER-TIME=400; WAVECAL=NO | | | 2700 Secs (2087 Secs)<br>*[==>2087.0 Secs ]* | <br>***[1]*** |

*Comments: ETC Run has H Ly-alpha flux increased be 10x, as the 52"x0.05" slit available is 10x smaller than the 52"x0.5". The ETC-predicted count/s should thus be accurate.*

*WAVECAL=NO set to maximize observation exposure time; WAVECAL can be scheduled outside visibility period.*

Orbit Structure



## Visit

**Proposal 17812, H-Bulge-130 (06), implementation** Fri Aug 15 17:00:32 GMT 2025

**Diagnostic Status: Warning**

Scientific Instruments: STIS/FUV-MAMA

Special Requirements: ORIENT 13D TO 102 D; ORIENT 193D TO 282 D; BETWEEN 19-JAN-2025 AND 19-APR-2025; BETWEEN 03-SEP-2025 AND 25-NOV-2025; BETWEEN 22-FEB-2026 AND 24-MAY-2026

*Comments: Orientation requirements were calculated to achieve the minimum required latitudinal coverage (-15 - 30 degrees latitude) on the planet's surface, assuming the long axis of the slit is positioned -45D East of North (counterclockwise) from the HST/STIS U3 axis.*

*As the latitudinal coverage is related to the angular diameter and north pole position angle (NPPA) of the planet, the allowable orientation angles change with time. Acceptable orient ranges for the period 03-SEP-2025 -- 25-NOV-2025 have been added below.*
**** If using the second date range, please contact for revised orient ranges!****

*There is no required order for the visits (and no hold is required), but completing all visits within a shorter amount of time (~1 month) is preferred.*

## Diagnostics

(H-Bulge-130 (06)) Warning (Form): A target acquisition should probably be performed before doing spectroscopy or coronography with STIS or COS.

(H-Bulge-130 (06)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(H-Bulge-130 (06)) Warning (Orbit Planner): STIS SCIENCE TOO FAR FROM WAVECAL

(H-Bulge-130 (06)) Informational (Form): The Visit Planner and Spike may produce different schedulability results.

## Solar System Targets

| # | Name | Level 1 | Level 2 | Level 3 | Window | Ephem Center |
|---|---|---|---|---|---|---|
| (6) | JUPITER-H-BULGE-130 | STD=JUPITER | TYPE=PGRAPHIC,LONG=130,LAT=10 | | NOT OCC OF JUPITER-H-BULGE-130 BY JUPITER FROM EARTH, NOT ECL P PARTIAL OF JUPITER-H-BULGE-130 BY IO FROM EARTH, NOT ECL P PARTIAL OF JUPITER-H-BULGE-130 BY EUROPA FROM EARTH, NOT ECL P PARTIAL OF JUPITER-H-BULGE-130 BY GANYMEDE FROM EARTH, NOT ECL P PARTIAL OF JUPITER-H-BULGE-130 BY CALLISTO FROM EARTH, SEP OF JUPITER-H-BULGE-130 IO FROM EARTH GT 10", SEP OF JUPITER-H-BULGE-130 EUROPA FROM EARTH GT 10", SEP OF JUPITER-H-BULGE-130 GANYMEDE FROM EARTH GT 10", SEP OF JUPITER-H-BULGE-130 CALLISTO FROM EARTH GT 10", CML OF JUPITER FROM EARTH BETWEEN 100 160 | EARTH |

*Comments: "Default Window" constraints regarding moon occultations can be removed, if necessary for schedulability.*
*Description=FEATURE JUPITER*
*Extended=YES*

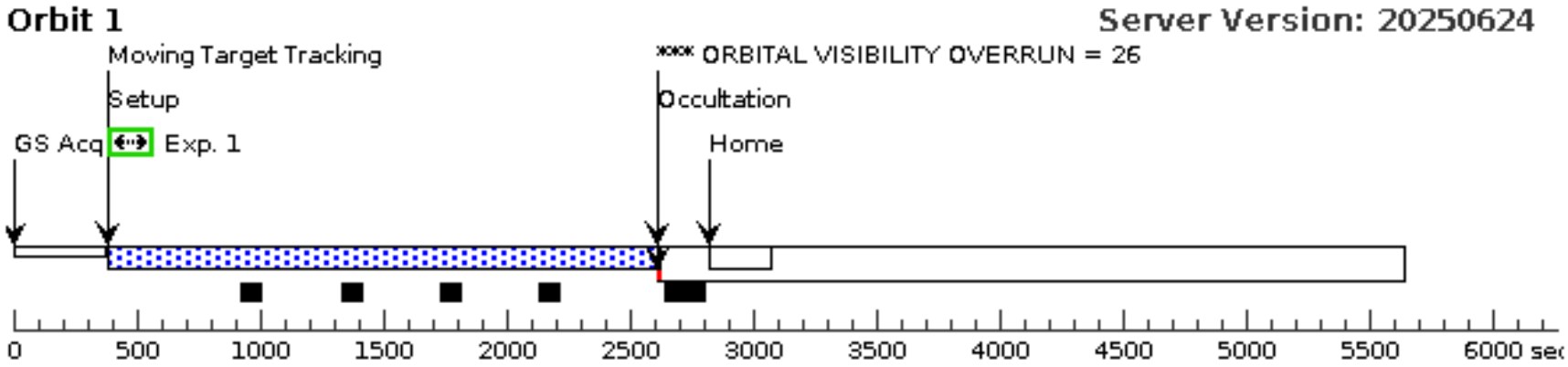
## Exposures

| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 130 (STIS.sp.1937593) | (6) JUPITER-H-BULGE-130 | STIS/FUV-MAMA, TIME-TAG, 52X0.5 | E140H 1234 A | BUFFER-TIME=400; WAVECAL=NO | | | 2700 Secs (2087 Secs)<br>*[==>2087.0 Secs ]* | <br>***[1]*** |

*Comments: ETC Run has H Ly-alpha flux increased be 10x, as the 52"x0.05" slit available is 10x smaller than the 52"x0.5". The ETC-predicted count/s should thus be accurate.*

*WAVECAL=NO set to maximize observation exposure time; WAVECAL can be scheduled outside visibility period.*

Orbit Structure



## Visit

**Proposal 17812, H-Bulge-150 (07), implementation** Fri Aug 15 17:00:32 GMT 2025

**Diagnostic Status: Warning**

Scientific Instruments: STIS/FUV-MAMA

Special Requirements: ORIENT 13D TO 102 D; ORIENT 193D TO 282 D; BETWEEN 19-JAN-2025 AND 19-APR-2025; BETWEEN 03-SEP-2025 AND 25-NOV-2025; BETWEEN 22-FEB-2026 AND 24-MAY-2026

*Comments: Orientation requirements were calculated to achieve the minimum required latitudinal coverage (-15 - 30 degrees latitude) on the planet's surface, assuming the long axis of the slit is positioned -45D East of North (counterclockwise) from the HST/STIS U3 axis.*

*As the latitudinal coverage is related to the angular diameter and north pole position angle (NPPA) of the planet, the allowable orientation angles change with time. Acceptable orient ranges for the period 03-SEP-2025 -- 25-NOV-2025 have been added below.*
**** If using the second date range, please contact for revised orient ranges!****

*There is no required order for the visits (and no hold is required), but completing all visits within a shorter amount of time (~1 month) is preferred.*

## Diagnostics

(H-Bulge-150 (07)) Warning (Form): A target acquisition should probably be performed before doing spectroscopy or coronography with STIS or COS.

(H-Bulge-150 (07)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(H-Bulge-150 (07)) Warning (Orbit Planner): STIS SCIENCE TOO FAR FROM WAVECAL

(H-Bulge-150 (07)) Informational (Form): The Visit Planner and Spike may produce different schedulability results.

## Solar System Targets

| # | Name | Level 1 | Level 2 | Level 3 | Window | Ephem Center |
|---|---|---|---|---|---|---|
| (7) | JUPITER-H-BULGE-150 | STD=JUPITER | TYPE=PGRAPHIC,LONG=150,LAT=10 | | NOT OCC OF JUPITER-H-BULGE-150 BY JUPITER FROM EARTH, NOT ECL P PARTIAL OF JUPITER-H-BULGE-150 BY IO FROM EARTH, NOT ECL P PARTIAL OF JUPITER-H-BULGE-150 BY EUROPA FROM EARTH, NOT ECL P PARTIAL OF JUPITER-H-BULGE-150 BY GANYMEDE FROM EARTH, NOT ECL P PARTIAL OF JUPITER-H-BULGE-150 BY CALLISTO FROM EARTH, SEP OF JUPITER-H-BULGE-150 IO FROM EARTH GT 10", SEP OF JUPITER-H-BULGE-150 EUROPA FROM EARTH GT 10", SEP OF JUPITER-H-BULGE-150 GANYMEDE FROM EARTH GT 10", SEP OF JUPITER-H-BULGE-150 CALLISTO FROM EARTH GT 10", CML OF JUPITER FROM EARTH BETWEEN 120 180 | EARTH |

*Comments: "Default Window" constraints regarding moon occultations can be removed, if necessary for schedulability.*
*Description=FEATURE JUPITER*
*Extended=YES*

## Exposures

| # | Label (ETC Run) | Target | Config,Mode,Aperture | Spectral Els. | Opt. Params. | Special Reqs. | Groups | Exp. Time (Total)/[Actual Dur.] | Orbit |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 150 (STIS.sp.1937593) | (7) JUPITER-H-BULGE-150 | STIS/FUV-MAMA, TIME-TAG, 52X0.5 | E140H 1234 A | BUFFER-TIME=400; WAVECAL=NO | | | 2700 Secs (2087 Secs)<br>*[==>2087.0 Secs ]* | <br>***[1]*** |

*Comments: ETC Run has H Ly-alpha flux increased be 10x, as the 52"x0.05" slit available is 10x smaller than the 52"x0.5". The ETC-predicted count/s should thus be accurate.*

*WAVECAL=NO set to maximize observation exposure time; WAVECAL can be scheduled outside visibility period.*

Orbit Structure