18083 - Extreme-UV to Near-UV Spectroscopic Exploration of the Lensed Quasar PG 1115+080

Cycle: 33, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*
Dra. Carina Fian (PI) (ESA Member) (Contact)	**Universidad de Valencia, Observatorio Astronomico**
Prof. Doron Chelouche (CoI) (CoPI)	University of Haifa
Dr. Shai Kaspi (CoI)	Tel Aviv University - Wise Observatory
Prof. Jose A. Munoz (CoI) (ESA Member)	Universidad de Valencia, Observatorio Astronomico
Prof. Adi Zitrin (CoI)	Ben-Gurion University of the Negev
Dr. David V. Bowen (CoI) (AdminUSPI)	Princeton University

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) QSO-B1115+080A	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	5	05-Sep-2025 16:00:16.0	yes
02	(1) QSO-B1115+080A CCDFLAT	STIS/CCD	2	05-Sep-2025 16:00:17.0	yes
03	(1) QSO-B1115+080A	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	5	05-Sep-2025 16:00:18.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
04	(1) QSO-B1115+080A CCDFLAT	STIS/CCD	2	05-Sep-2025 16:00:19.0	yes

14 Total Orbits Used

ABSTRACT

Emerging evidence indicates that traditional models of black hole accretion are incomplete - quasar accretion disks appear systematically larger than predicted, a discrepancy that challenges our understanding of disk structure, black hole growth, and the use of quasars as standard candles. Gravitational microlensing has been proven successful in studying quasar interiors that remain unresolvable by conventional imaging techniques. The gravitationally lensed quasar PG 1115+080 offers an ideal natural experiment; its fold-caustic configuration produces a close image pair that, through microlensing effects, serves as a "zoom" on the smallest emission regions. We propose a small HST/STIS program designed to obtain continuous spectroscopy from the extreme ultraviolet (UV) to the near UV. This extensive spectral coverage will probe the innermost emission regions of the quasar - capturing the hottest accretion disk zones near the Lyman limit and linking them to the extended near UV continuum. Our observations will cover a wealth of emission features, including prominent broad lines and several little-explored lines in the extreme/far UV, thereby offering new insights into the ionization structure and gas kinematics of the broad-line region. By measuring the wavelength-dependent microlensing magnification of the continuum, we will determine the disk size as a function of wavelength - a critical test of thin-disk theory. These observations are especially timely, as HST/STIS is currently the only facility capable of accessing the extreme and far UV regimes. Without it, this spectral window, and the physics it probes, will remain out of reach.

OBSERVING DESCRIPTION

Target & Goal: Resolved STIS spectroscopy of PG 1115+080 to extract separate spectra of images A1 and A2.
Orient: We require an ORIENT that puts A1 and A2 along the slit with > 0.40 arcsec separation.
Acquisition. One STIS/CCD ACQ (POINT) at the start of each visit.
Scheduling. Visits limited to short contiguous blocks (2-5 orbits) to avoid MAMA SAA conflicts.
FUV-/NUV-MAMA Spectroscopy: Time-Tag; Buffer-Time: 4/5 x ETC.
CCD Spectroscopy - G430L & G750L: Accum; we add fringe flats immediately after the red science with no grating move.

Proposal 18083 - Visit 1: 5 Orbits (01) - Extreme-UV to Near-UV Spectroscopic Exploration of the Lensed Quasar PG 1115+080

Visit

Proposal 18083, Visit 1: 5 Orbits (01), implementation Fri Sep 05 20:00:19 GMT 2025

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/NUV-MAMA, STIS/CCD, STIS/FUV-MAMA

Special Requirements: ORIENT 253.7D TO 276.9 D; BEFORE 19-FEB-2026:00:00:00

Fixed Targets

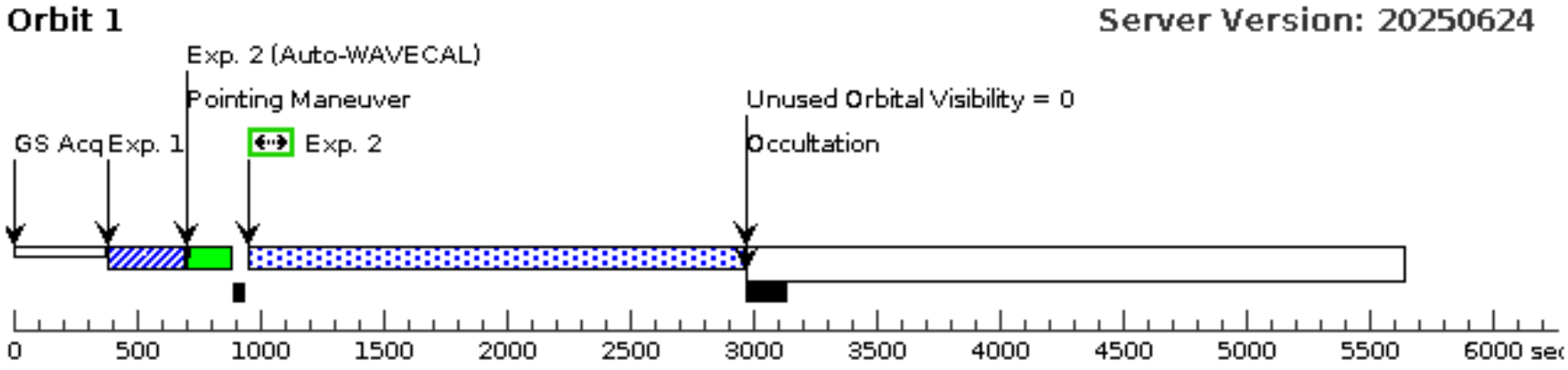
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	QSO-B1115+080A	RA: 11 18 16.9531 (169.5706379d) Dec: +07 45 58.16 (7.76616d) Equinox: J2000	Epoch of Position: 2000 Redshift: 1.722	V=16.90+/-0.11	Reference Frame: ICRS

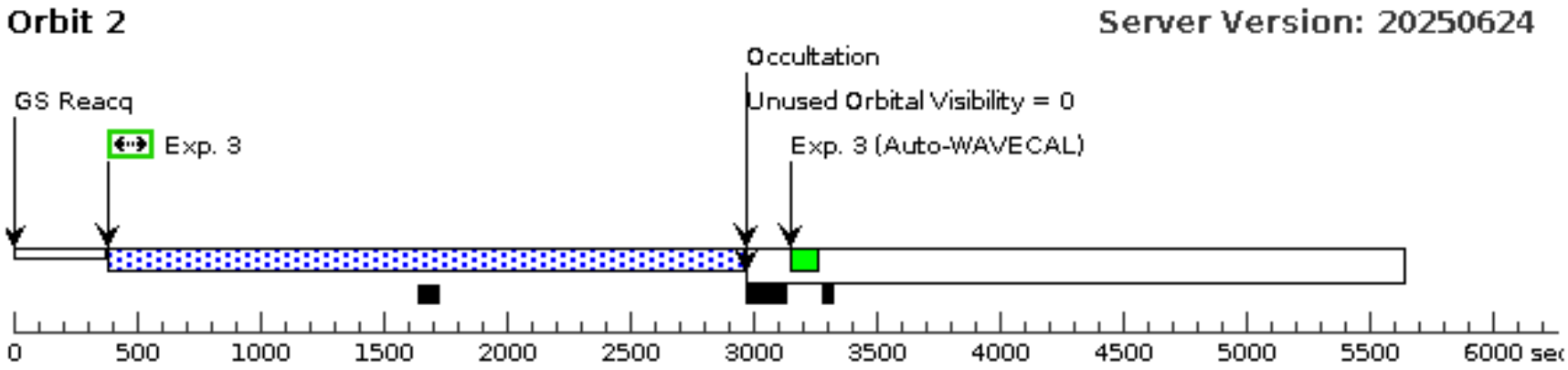
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=GALAXY
Description=[GRAVITATIONAL LENS, QSO, QUASAR]
Extended=NO

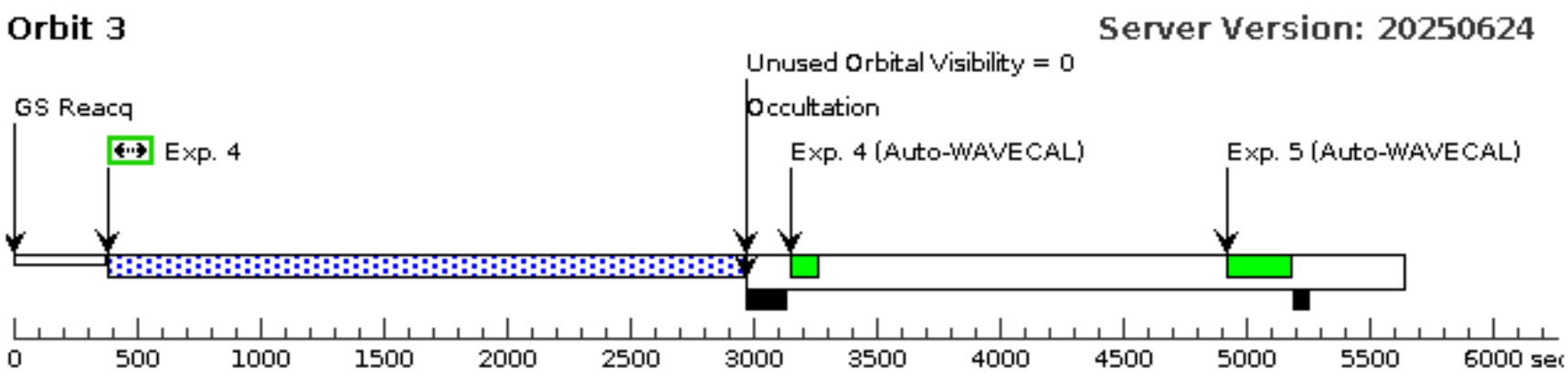
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Target Acquisition	(1) QSO-B1115+080A	STIS/CCD, ACQ, F28X50LP	MIRROR				20 Secs (20 Secs) *[==>]*	 ***[1]***
2	G140L 1/3 (2025234)	(1) QSO-B1115+080A	STIS/FUV-MAMA, TIME-TAG, 52X2	G140L 1425 A	BUFFER-TIME=1265			1952 Secs (1952 Secs) *[==>]*	 ***[1]***
3	G140L 2/3 (2025234)	(1) QSO-B1115+080A	STIS/FUV-MAMA, TIME-TAG, 52X2	G140L 1425 A	BUFFER-TIME=1265			2569 Secs (2569 Secs) *[==>]*	 ***[2]***
4	G140L 3/3 (2025234)	(1) QSO-B1115+080A	STIS/FUV-MAMA, TIME-TAG, 52X2	G140L 1425 A	BUFFER-TIME=1265			2529 Secs (2529 Secs) *[==>]*	 ***[3]***
5	G230L 1/2 (2025235)	(1) QSO-B1115+080A	STIS/NUV-MAMA, TIME-TAG, 52X2	G230L 2376 A	BUFFER-TIME=1420			2544 Secs (2544 Secs) *[==>]*	 ***[4]***
6	G230L 2/2 (2025235)	(1) QSO-B1115+080A	STIS/NUV-MAMA, TIME-TAG, 52X2	G230L 2376 A	BUFFER-TIME=1420			2544 Secs (2544 Secs) *[==>]*	 ***[5]***

Orbit Structure



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Exp. 4 (Auto-WAVECAL)
Exp. 5 (Auto-WAVECAL)
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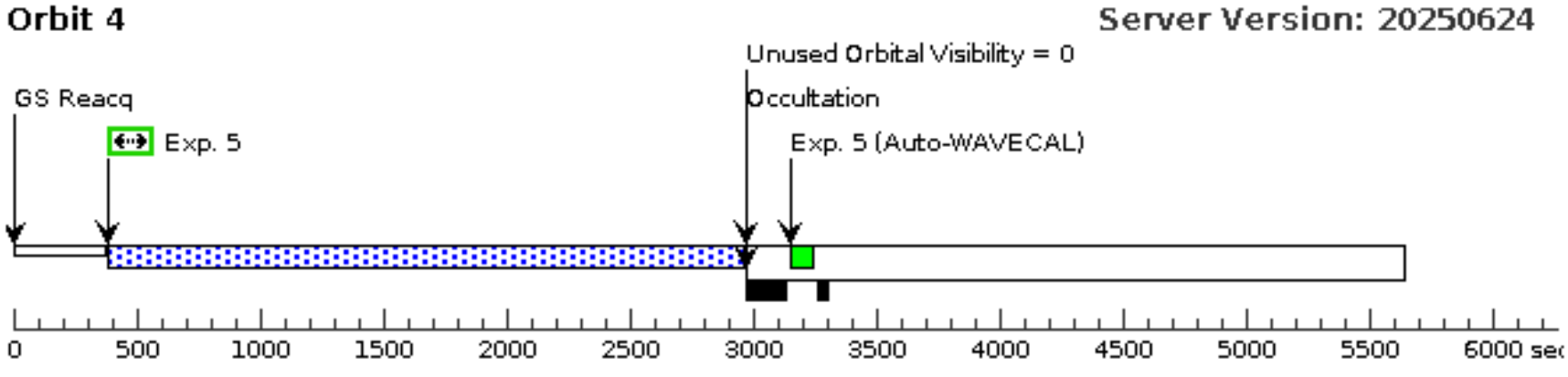
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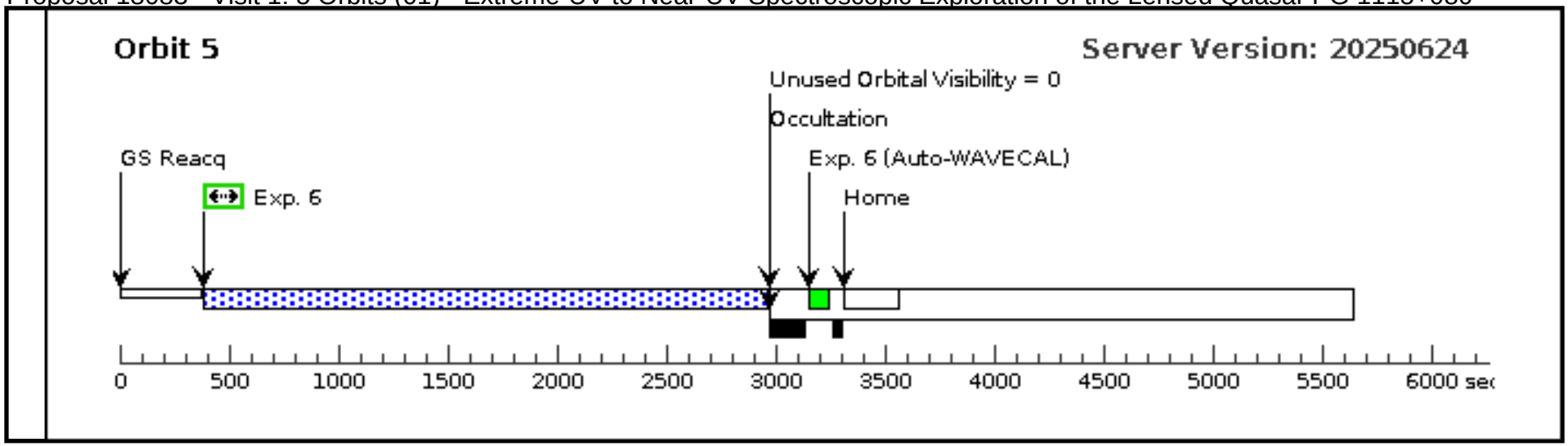
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6000 sec

Visit

Proposal 18083, Visit 2: 2 Orbits (02), implementation Fri Sep 05 20:00:20 GMT 2025

Diagnostic Status: Informational

Scientific Instruments: STIS/CCD

Special Requirements: SAME ORIENT AS 01; AFTER 01 BY 0 D TO 3 D

Diagnostics

(Visit 2: 2 Orbits (02)) Informational (Form): The Visit Planner and Spike may produce different schedulability results.

Fixed Targets

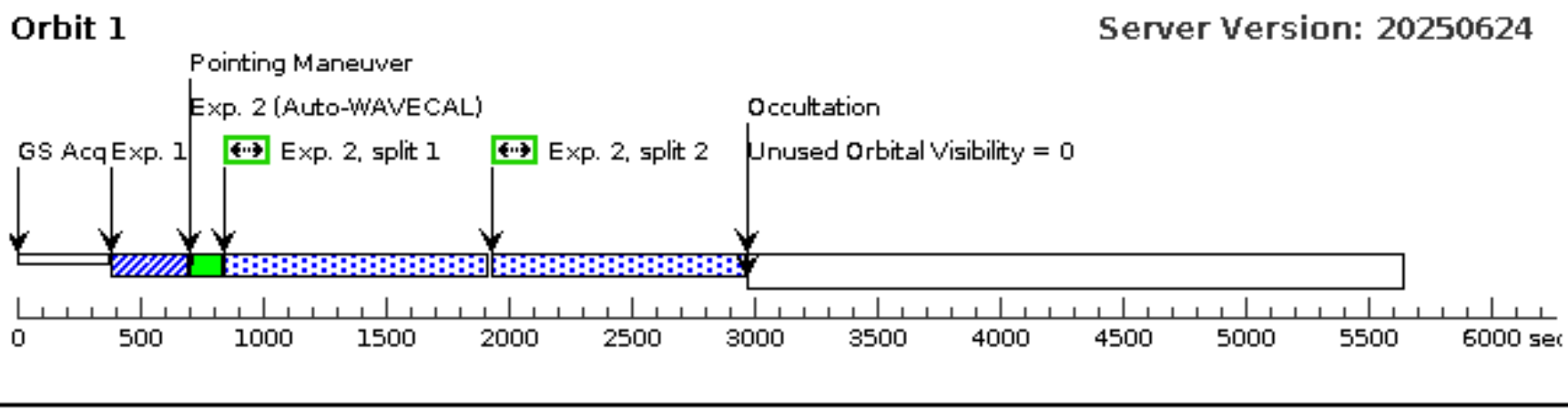
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	QSO-B1115+080A	RA: 11 18 16.9531 (169.5706379d) Dec: +07 45 58.16 (7.76616d) Equinox: J2000	Epoch of Position: 2000 Redshift: 1.722	V=16.90+/-0.11	Reference Frame: ICRS

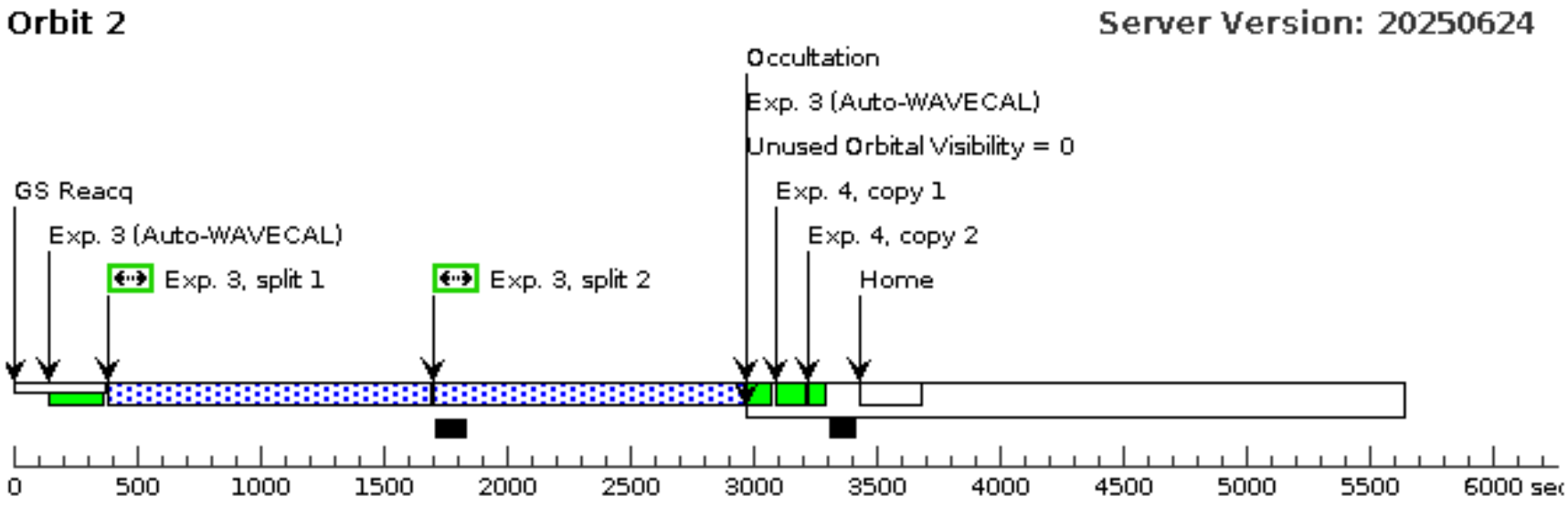
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=GALAXY
Description=[GRAVITATIONAL LENS, QSO, QUASAR]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Target Acquisition	(1) QSO-B1115+080A	STIS/CCD, ACQ, F28X50LP	MIRROR				20 Secs (20 Secs) *[==>]*	***[1]***
2	G430L 1/1 (2025236)	(1) QSO-B1115+080A	STIS/CCD, ACCUM, 52X2	G430L 4300 A				1986 Secs (1986 Secs) *[==>(Split 1)]* *[==>(Split 2)]*	***[1]***
3	G750L 1/1 (2025237)	(1) QSO-B1115+080A	STIS/CCD, ACCUM, 52X2	G750L 7751 A				2455 Secs (2455 Secs) *[==>(Split 1)]* *[==>(Split 2)]*	***[2]***
4	Fringe Flat	CCDFLAT	STIS/CCD, ACCUM, 52X2	G750L 7751 A				*[==>(Copy 1)]* *[==>(Copy 2)]*	***[2]***

Orbit Structure





Proposal 18083 - Visit 3: 5 Orbits (03) - Extreme-UV to Near-UV Spectroscopic Exploration of the Lensed Quasar PG 1115+080

Visit

Proposal 18083, Visit 3: 5 Orbits (03), implementation Fri Sep 05 20:00:20 GMT 2025

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/NUV-MAMA, STIS/CCD, STIS/FUV-MAMA

Special Requirements: ORIENT 253.7D TO 276.9 D; AFTER 19-FEB-2026:00:00:00

Fixed Targets

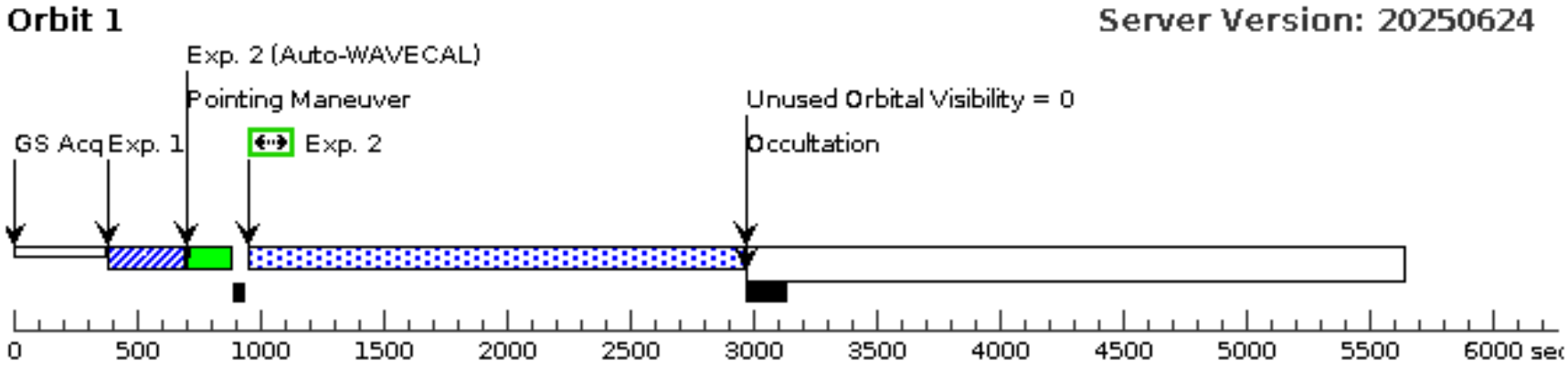
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	QSO-B1115+080A	RA: 11 18 16.9531 (169.5706379d) Dec: +07 45 58.16 (7.76616d) Equinox: J2000	Epoch of Position: 2000 Redshift: 1.722	V=16.90+/-0.11	Reference Frame: ICRS

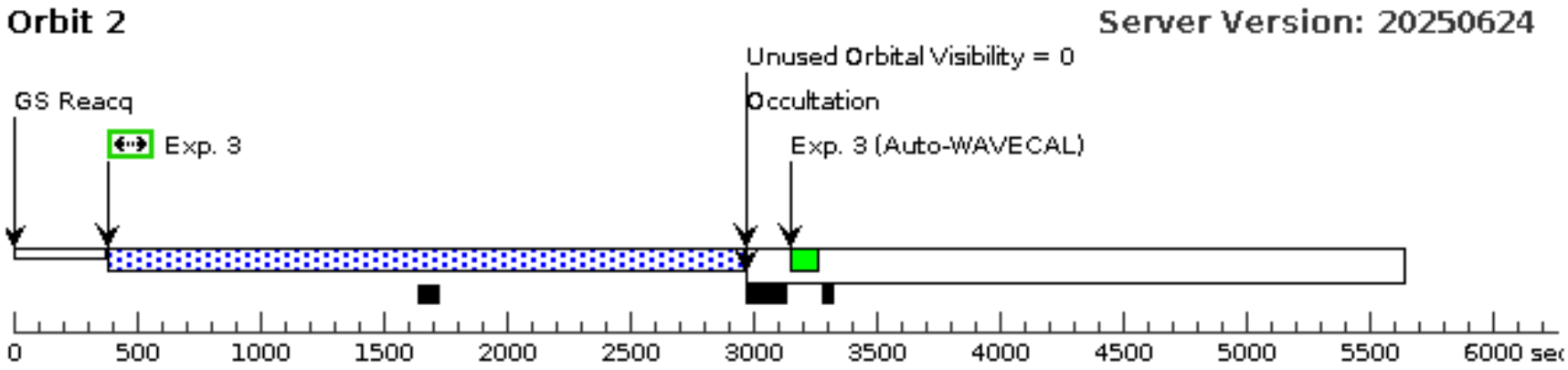
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=GALAXY
Description=[GRAVITATIONAL LENS, QSO, QUASAR]
Extended=NO

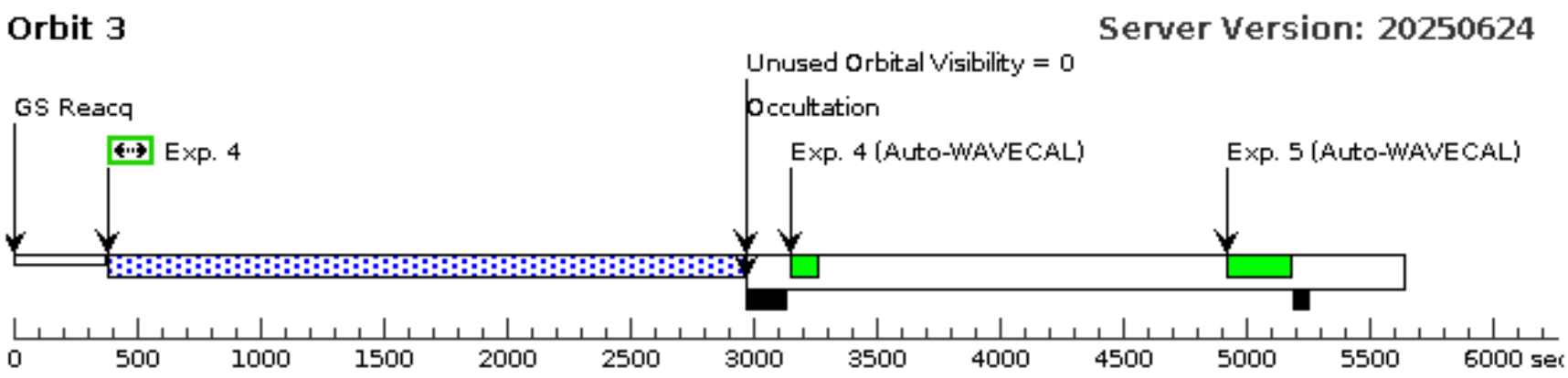
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Target Acquisition	(1) QSO-B1115+080A	STIS/CCD, ACQ, F28X50LP	MIRROR				20 Secs (20 Secs) *[==>]*	 ***[1]***
2	G140L 1/3 (2025234)	(1) QSO-B1115+080A	STIS/FUV-MAMA, TIME-TAG, 52X2	G140L 1425 A	BUFFER-TIME=1265			1952 Secs (1952 Secs) *[==>]*	 ***[1]***
3	G140L 2/3 (2025234)	(1) QSO-B1115+080A	STIS/FUV-MAMA, TIME-TAG, 52X2	G140L 1425 A	BUFFER-TIME=1265			2569 Secs (2569 Secs) *[==>]*	 ***[2]***
4	G140L 3/3 (2025234)	(1) QSO-B1115+080A	STIS/FUV-MAMA, TIME-TAG, 52X2	G140L 1425 A	BUFFER-TIME=1265			2529 Secs (2529 Secs) *[==>]*	 ***[3]***
5	G230L 1/2 (2025235)	(1) QSO-B1115+080A	STIS/NUV-MAMA, TIME-TAG, 52X2	G230L 2376 A	BUFFER-TIME=1420			2544 Secs (2544 Secs) *[==>]*	 ***[4]***
6	G230L 2/2 (2025235)	(1) QSO-B1115+080A	STIS/NUV-MAMA, TIME-TAG, 52X2	G230L 2376 A	BUFFER-TIME=1420			2544 Secs (2544 Secs) *[==>]*	 ***[5]***

Orbit Structure



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Unused Orbital Visibility = 0
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Exp. 5 (Auto-WAVECAL)
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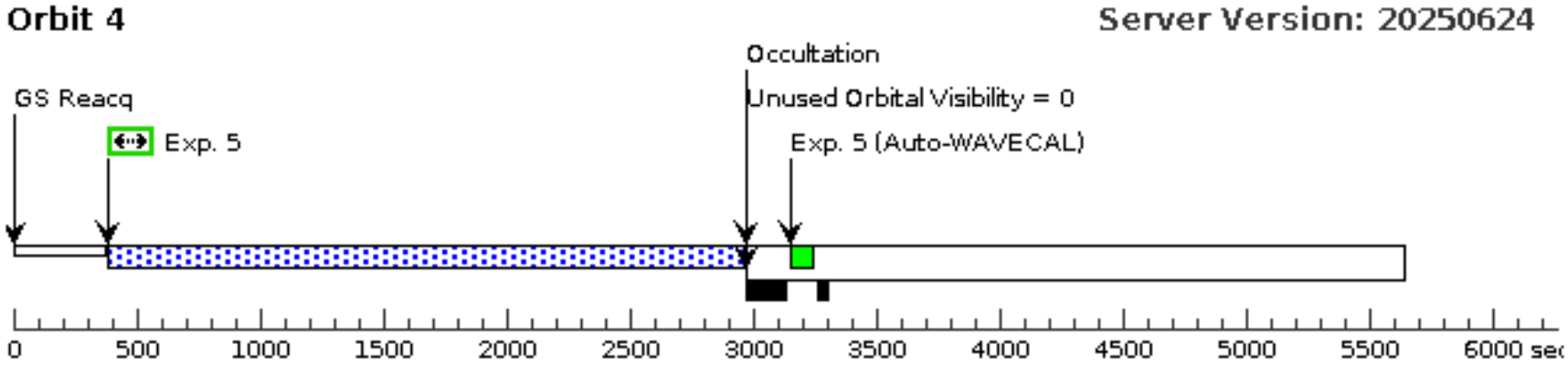
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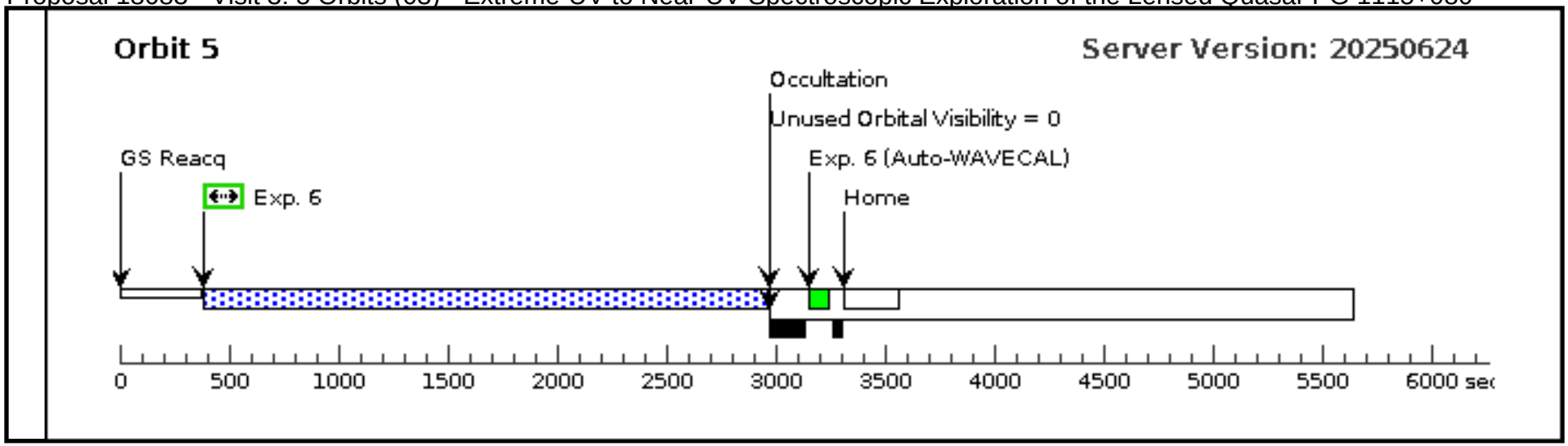
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6000 sec

Visit

Proposal 18083, Visit 4: 5 Orbits (04), implementation Fri Sep 05 20:00:20 GMT 2025

Diagnostic Status: Informational

Scientific Instruments: STIS/CCD

Special Requirements: SAME ORIENT AS 03; AFTER 03 BY 0 D TO 3 D

Diagnostics

(Visit 4: 5 Orbits (04)) Informational (Form): The Visit Planner and Spike may produce different schedulability results.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	QSO-B1115+080A	RA: 11 18 16.9531 (169.5706379d) Dec: +07 45 58.16 (7.76616d) Equinox: J2000	Epoch of Position: 2000 Redshift: 1.722	V=16.90+/-0.11	Reference Frame: ICRS

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
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Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Target Acquisition	(1) QSO-B1115+080A	STIS/CCD, ACQ, F28X50LP	MIRROR				20 Secs (20 Secs) *[==>]*	***[1]***
2	G430L 1/1 (2025236)	(1) QSO-B1115+080A	STIS/CCD, ACCUM, 52X2	G430L 4300 A				1986 Secs (1986 Secs) *[==>(Split 1)]* *[==>(Split 2)]*	***[1]***
3	G750L 1/1 (2025237)	(1) QSO-B1115+080A	STIS/CCD, ACCUM, 52X2	G750L 7751 A				2455 Secs (2455 Secs) *[==>(Split 1)]* *[==>(Split 2)]*	***[2]***
4	Fringe Flat	CCDFLAT	STIS/CCD, ACCUM, 52X2	G750L 7751 A				*[==>(Copy 1)]* *[==>(Copy 2)]*	***[2]***

Orbit Structure