16710 - Measuring ionizing photon escape from an exceptionally bright gravitationally lensed arc at z=1.43

Cycle: 29, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) CSWA-141	WFC3/UVIS	4	29-Jul-2021 11:01:23.0	yes
02	(1) CSWA-141	WFC3/UVIS	3	29-Jul-2021 11:01:24.0	yes
03	(1) CSWA-141	WFC3/UVIS	3	29-Jul-2021 11:01:24.0	yes

10 Total Orbits Used

ABSTRACT

We propose WFC3 UVIS/G280 grism observations to measure escaping ionizing photons (LyC) from a galaxy at z=1.43 having nebular conditions similar to reionization era systems. The galaxy is a uniquely bright (r~20) gravitationally lensed system with an extended arc (9" long) allowing ionizing photon escape at a sub-kpc level. Based on a newly developed indirect measure of LyC escape fraction using Mg II emission lines, the galaxy is inferred to be a strong LyC leaker with ionizing photons escape fraction (dust corrected) of 27+/-4%. The proposed observations will (i)

directly test the utility of Mg II based measure of LyC escape fraction for a high redshift galaxy, (ii) provide a sub-kpc map of ionizing photon escape allowing detailed probe of LyC escape. To date, only one source exists at any redshift where a spatially resolved study of LyC photons is possible. However, it is not clear whether the source is representative of reionization era galaxies. Our observations will exploit the ultraviolet capability of HST allowing the study of production and escape of ionizing photons from an exceptionally bright z=1.43 galaxy that is representative of reionization epoch.

OBSERVING DESCRIPTION

We will use WFC3 UVIS G280 grism to obtain Lyman continuum and Lyman-alpha in a bright gravitationally lensed arc (r=20.5) at z=1.425. We select the coordinates of the brightest star forming region as the RA/DEC and place it at the center of chip2 in order to boost the QE and flux calibration at shorter wavelengths. We split total 10 orbits into 3 visits (4 orbits, 3 orbits and 3 orbits) to improve schedulability. Prior to each visit, we will obtain two direct imaging using F300X with integration time of 200s each. For undispersed imaging, we will use G280-REF as an aperture. Following suggestion from the Instrument Scientist, we will use post-flash for the F300X images to achieve a background of ~20 electron/pix. In order to avoid contamination from a bright source, we request an ORIENT angle of 113 degree. This will ensure non contamination of spectra by nearby bright sources around the wavelength of interests.

Visit

Proposal 16710, CSWA-141-visit1 (01) Thu Jul 29 15:01:25 GMT 2021

Diagnostic Status: Warning

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 113D TO 113 D; ORIENT 293D TO 293 D

Diagnostics

(Undispersed (01.001)) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser

Fixed Targets

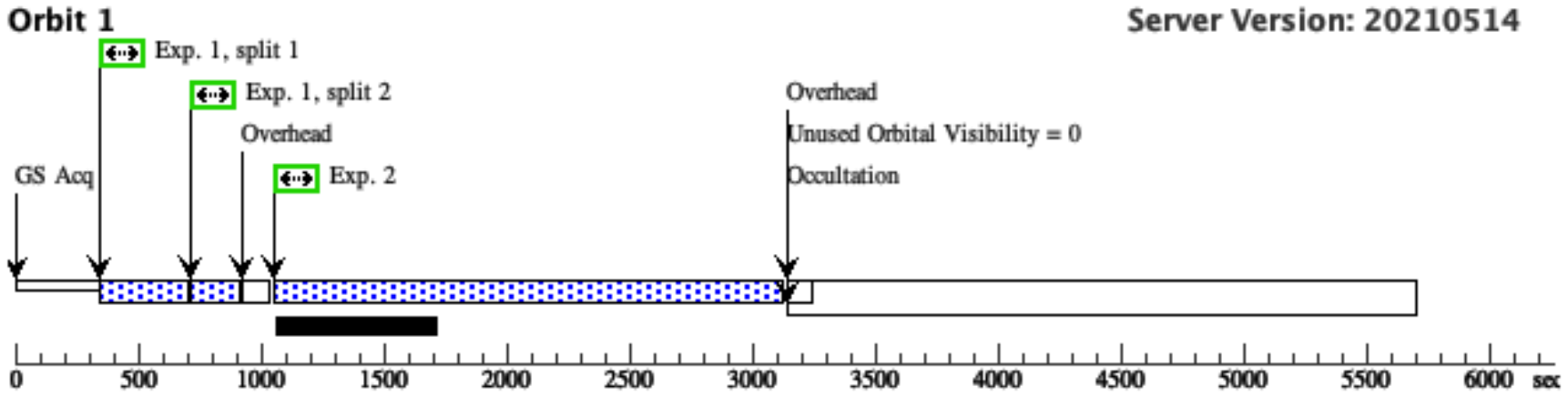
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	CSWA-141	RA: 08 46 47.5000 (131.6979167d) Dec: +04 46 9.65 (4.76935d) Equinox: J2000		V=20.5+/-0.2	Reference Frame: ICRS

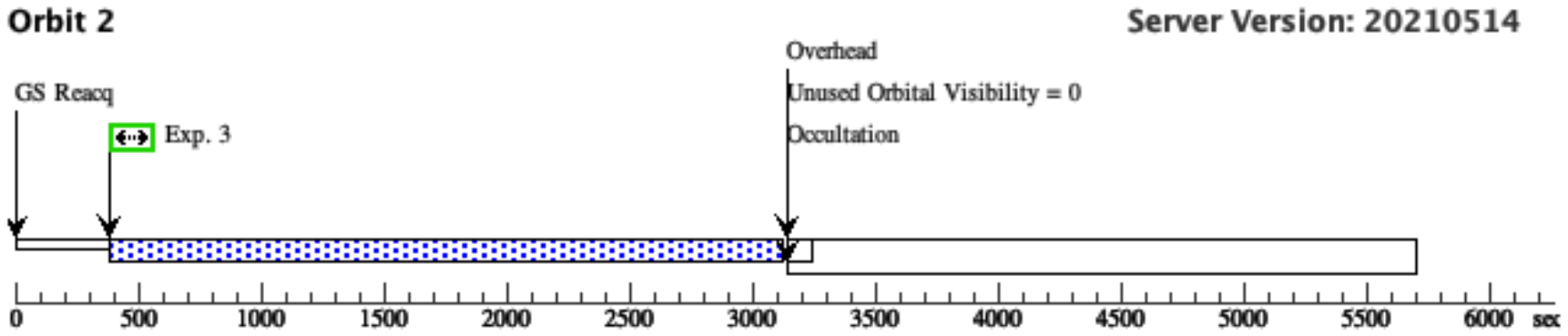
Comments:
Category=GALAXY
Description=[GRAVITATIONAL LENS, HIGH REDSHIFT GALAXY, STARBURST]

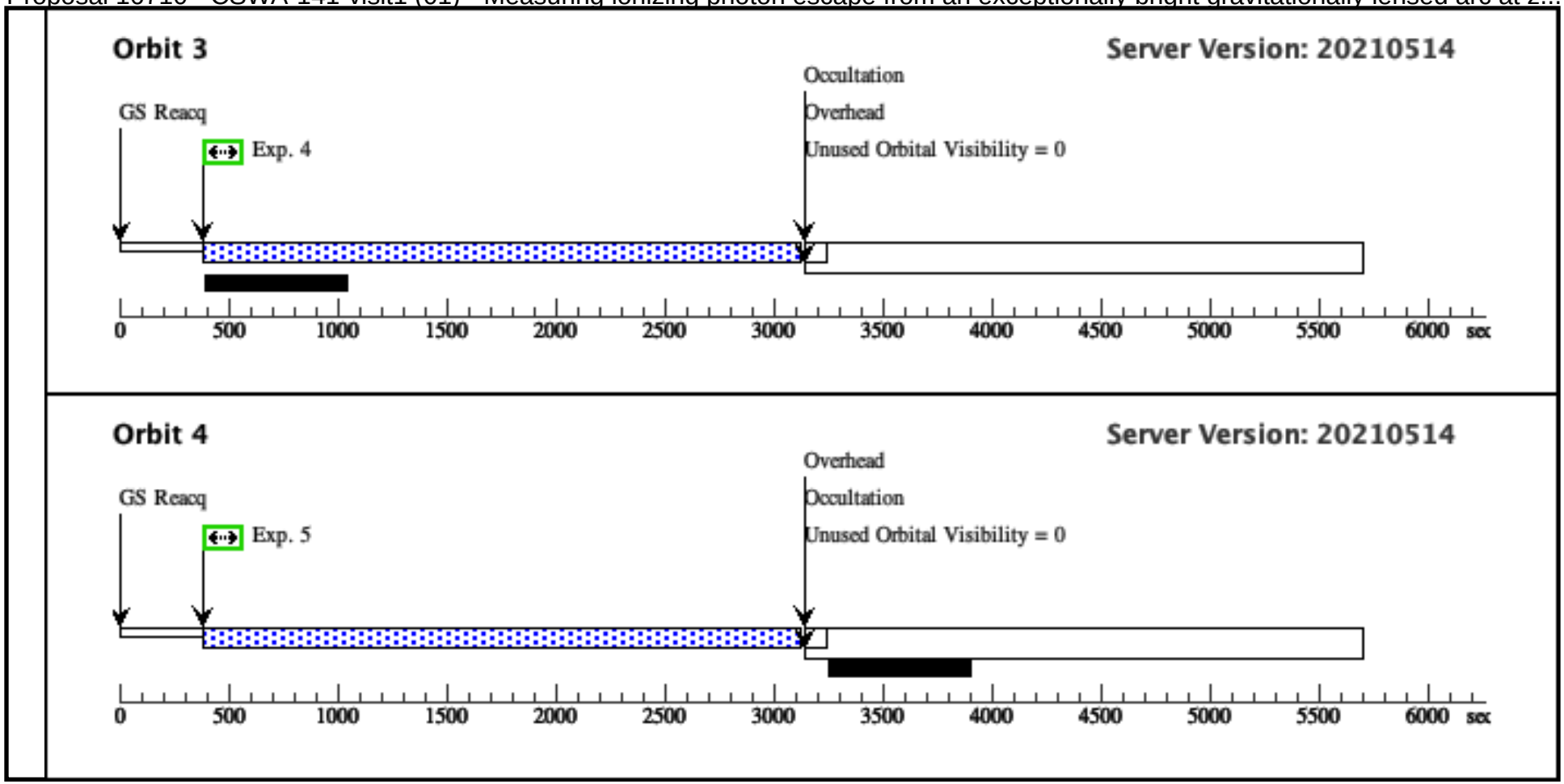
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Undispersed	(1) CSWA-141	WFC3/UVIS, ACCUM, G280-REF	F300X	CR-SPLIT=2; FLASH=19	POS TARG null,-50		400 Secs (400 Secs) *[==>(Split 1)]* *[==>(Split 2)]*	***[1]***
2	Dispersed	(1) CSWA-141	WFC3/UVIS, ACCUM, UVIS	G280		POS TARG null,-50		2105 Secs (2067 Secs) *[==>2067.0 Secs]*	***[1]***
3	Dispersed	(1) CSWA-141	WFC3/UVIS, ACCUM, UVIS	G280		POS TARG null,-50		2780 Secs (2742 Secs) *[==>2742.0 Secs]*	***[2]***
4	Dispersed	(1) CSWA-141	WFC3/UVIS, ACCUM, UVIS	G280		POS TARG null,-50		2780 Secs (2742 Secs) *[==>2742.0 Secs]*	***[3]***
5	Dispersed	(1) CSWA-141	WFC3/UVIS, ACCUM, UVIS	G280		POS TARG null,-50		2780 Secs (2742 Secs) *[==>2742.0 Secs]*	***[4]***

Orbit Structure



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sec

Visit

Proposal 16710, CSWA-141-visit2 (02) Thu Jul 29 15:01:25 GMT 2021

Diagnostic Status: Warning

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 113D TO 113 D; ORIENT 293D TO 293 D

Diagnostics

(Undispersed (02.001)) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser

Fixed Targets

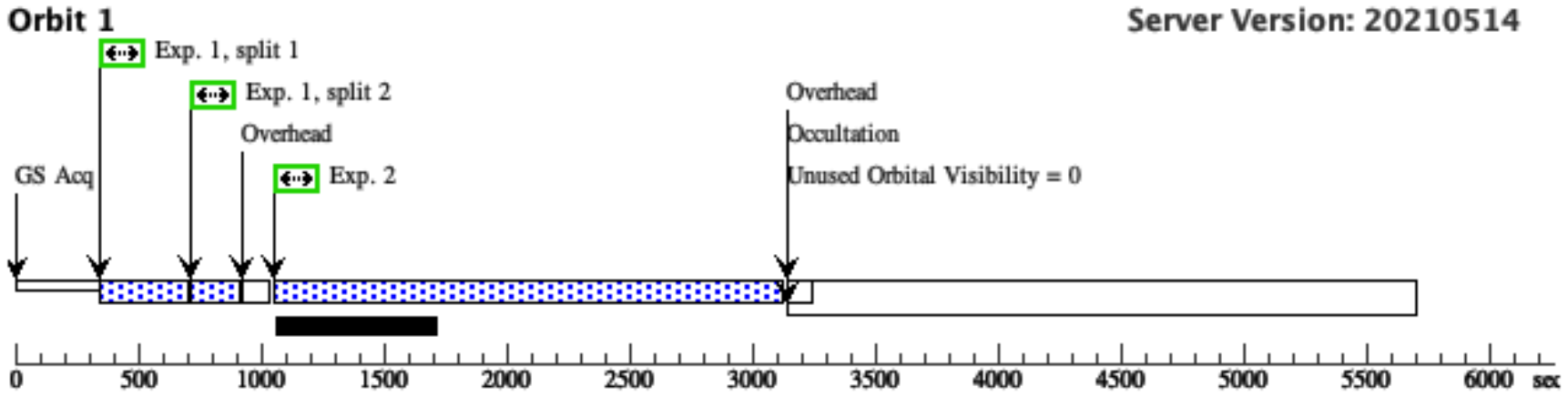
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	CSWA-141	RA: 08 46 47.5000 (131.6979167d) Dec: +04 46 9.65 (4.76935d) Equinox: J2000		V=20.5+/-0.2	Reference Frame: ICRS

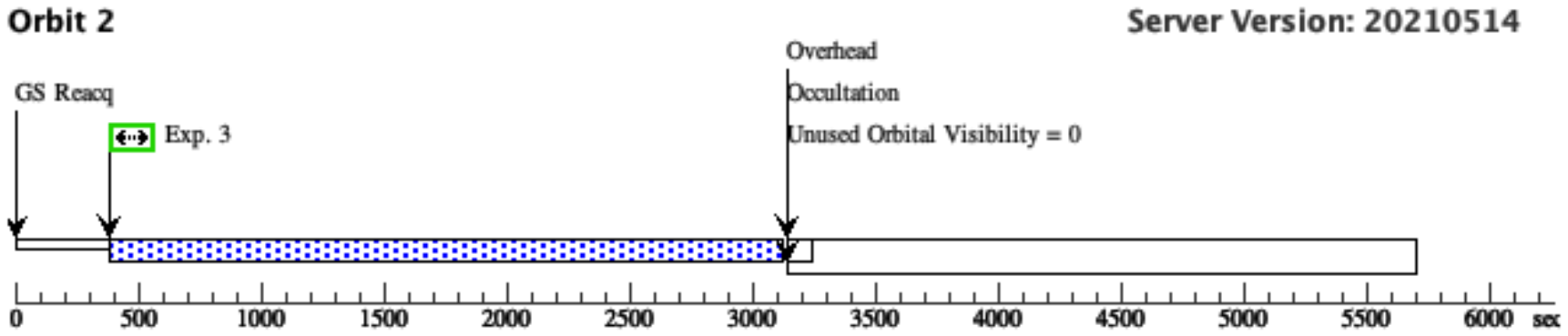
Comments:
Category=GALAXY
Description=[GRAVITATIONAL LENS, HIGH REDSHIFT GALAXY, STARBURST]

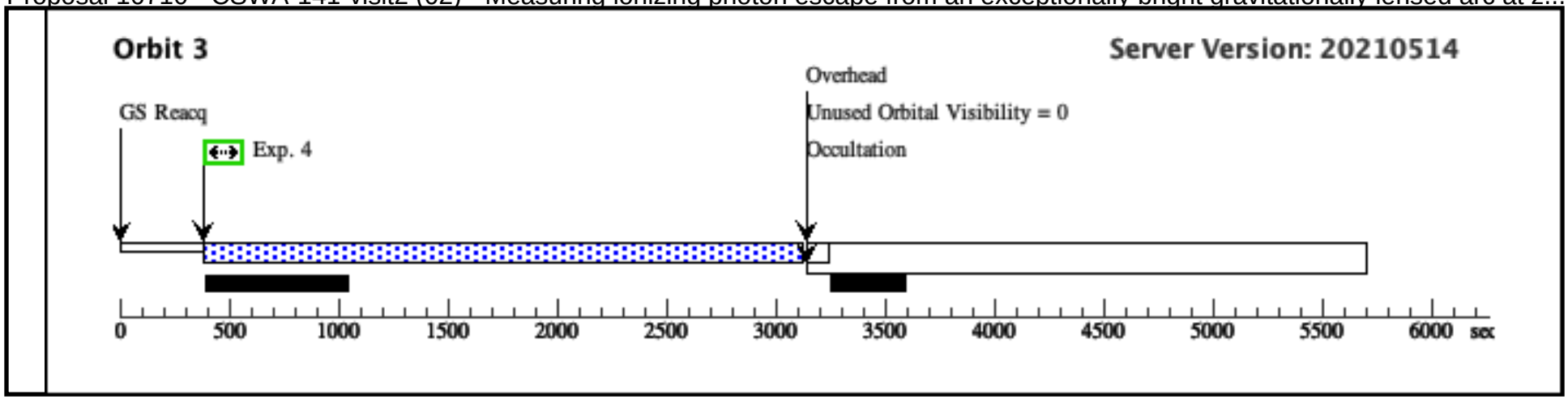
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Undispersed	(1) CSWA-141	WFC3/UVIS, ACCUM, G280-REF	F300X	FLASH=19; CR-SPLIT=2	POS TARG -0.092,-50.098		400 Secs (400 Secs) *[==>(Split 1)]* *[==>(Split 2)]*	***[1]***
2	Dispersed	(1) CSWA-141	WFC3/UVIS, ACCUM, UVIS	G280		POS TARG -0.092,-50.098		2105 Secs (2067 Secs) *[==>2067.0 Secs]*	***[1]***
3	Dispersed	(1) CSWA-141	WFC3/UVIS, ACCUM, UVIS	G280		POS TARG -0.092,-50.098		2780 Secs (2742 Secs) *[==>2742.0 Secs]*	***[2]***
4	Dispersed	(1) CSWA-141	WFC3/UVIS, ACCUM, UVIS	G280		POS TARG -0.092,-50.098		2780 Secs (2742 Secs) *[==>2742.0 Secs]*	***[3]***

Orbit Structure



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Visit

Proposal 16710, CSWA-141-visit3 (03) Thu Jul 29 15:01:25 GMT 2021

Diagnostic Status: Warning

Scientific Instruments: WFC3/UVIS

Special Requirements: ORIENT 113D TO 113 D; ORIENT 293D TO 293 D

Diagnostics

(Undispersed (03.001)) Warning (Form): FLASH level may be too high for this exposure or a long subexposure. See extended explanation in the diagnostic browser

Fixed Targets

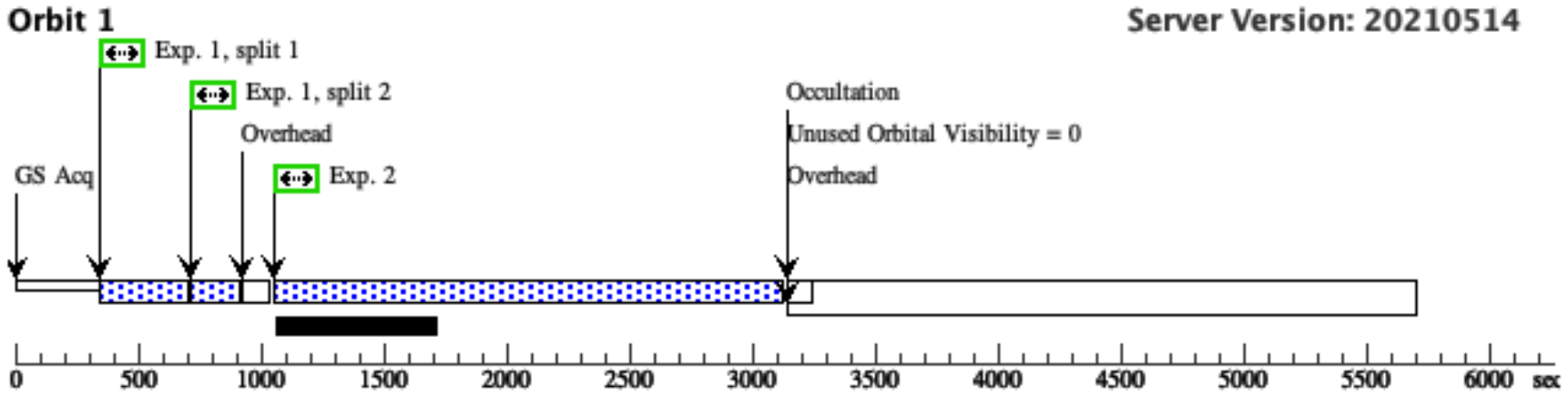
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	CSWA-141	RA: 08 46 47.5000 (131.6979167d) Dec: +04 46 9.65 (4.76935d) Equinox: J2000		V=20.5+/-0.2	Reference Frame: ICRS

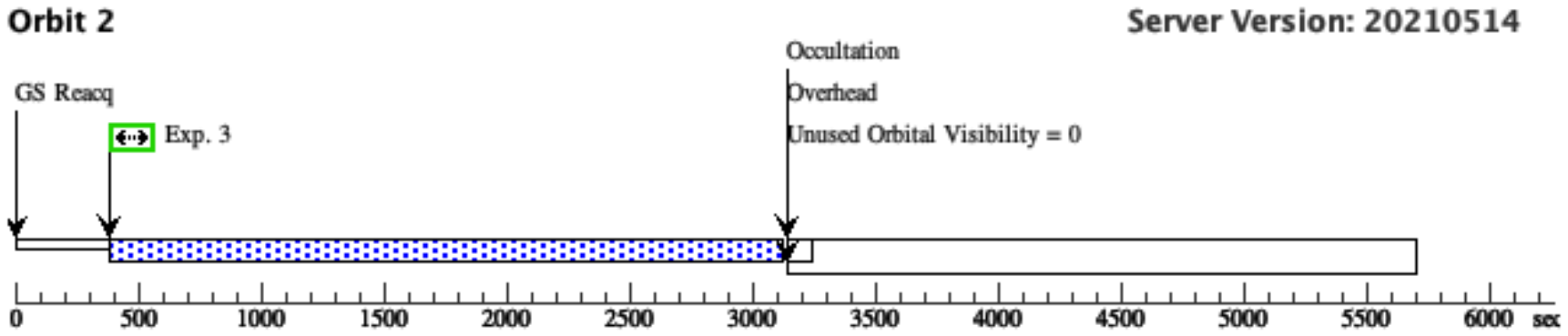
Comments:
Category=GALAXY
Description=[GRAVITATIONAL LENS, HIGH REDSHIFT GALAXY, STARBURST]

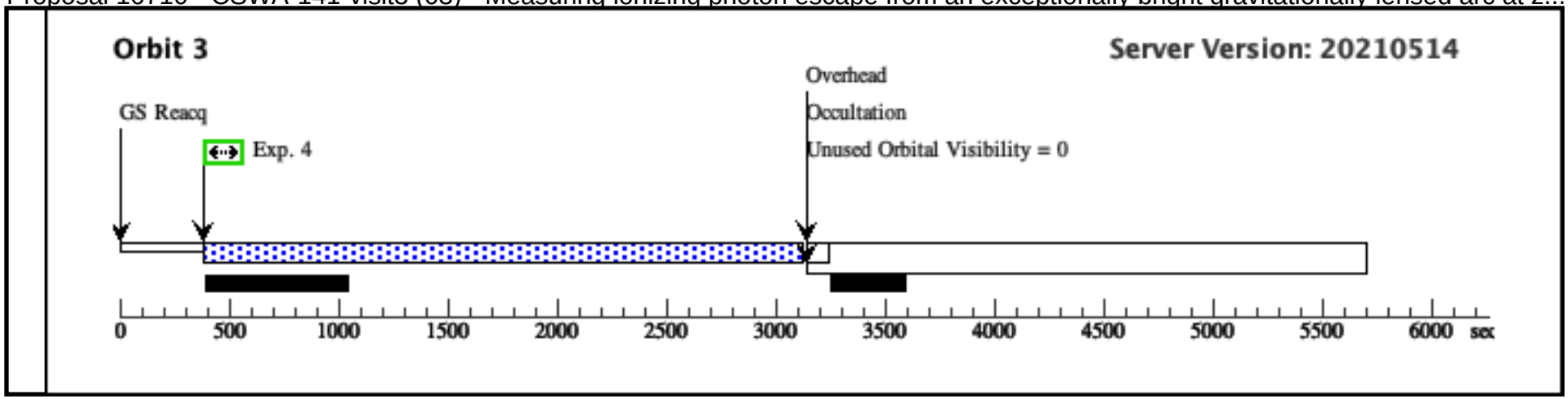
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Undispersed	(1) CSWA-141	WFC3/UVIS, ACCUM, G280-REF	F300X	FLASH=19; CR-SPLIT=2	POS TARG -0.185,-50.197		400 Secs (400 Secs) *[==>(Split 1)]* *[==>(Split 2)]*	***[1]***
2	Dispersed	(1) CSWA-141	WFC3/UVIS, ACCUM, UVIS	G280		POS TARG -0.185,-50.197		2105 Secs (2067 Secs) *[==>2067.0 Secs]*	***[1]***
3	Dispersed	(1) CSWA-141	WFC3/UVIS, ACCUM, UVIS	G280		POS TARG -0.185,-50.197		2780 Secs (2742 Secs) *[==>2742.0 Secs]*	***[2]***
4	Dispersed	(1) CSWA-141	WFC3/UVIS, ACCUM, UVIS	G280		POS TARG -0.185,-50.197		2780 Secs (2742 Secs) *[==>2742.0 Secs]*	***[3]***

Orbit Structure






Orbit 3
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