17578 - Eat Your Green Pea Galaxies!7

Cycle: 31, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*
Prof. Jimmy A. Irwin (PI) (Contact)	**University of Alabama**
Dr. Alejandro Lumbreras Calle (CoI) (ESA Member)	Centro de Estudios de Fisica del Cosmos de Aragon
Dr. Renato A. Dupke (CoI)	Eureka Scientific Inc.

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) J-PLUS-EELG-1	WFC3/UVIS	1	14-Jun-2024 13:00:55.0	yes
02	(2) J-PLUS-EELG-2	WFC3/UVIS	1	14-Jun-2024 13:00:56.0	yes
03	(3) J-PLUS-EELG-3	WFC3/UVIS	1	14-Jun-2024 13:00:57.0	yes
04	(4) J-PLUS-EELG-4	WFC3/UVIS	1	14-Jun-2024 13:00:58.0	yes
05	(5) J-PLUS-EELG-5	WFC3/UVIS	1	14-Jun-2024 13:00:59.0	yes
06	(6) J-PLUS-EELG-6	WFC3/UVIS	1	14-Jun-2024 13:00:59.0	yes
07	(7) J-PLUS-EELG-7	WFC3/UVIS	1	14-Jun-2024 13:01:00.0	yes

7 Total Orbits Used

ABSTRACT

The early Universe was re-ionized by high energy photons for which high-mass X-ray binaries (HMXBs) in low-metallicity, dwarf galaxies with high SFR might have contributed significantly to the process. Green Pea galaxies are believed to be low-z analogs to these cosmologically important ionizers, and are characterized by strong [OIII] emission indicative of a very young stellar population. As such, they are predicted to have a high

L_{X,HMXB}/SFR ratio. We have identified seven new Green Pea galaxies with J-PLUS that are near enough to be detected with Chandra, and our sample will double the number of X-ray detected Green Peas. Our goal is to use the X-ray emission with joint HST imaging to trace the connection between HMXBs and star formation in such extreme emission line galaxies.

OBSERVING DESCRIPTION

In this proposal, we intend to analyze the morphology of low redshift Green Pea galaxies with high spatial resolution. First, we intend to study the spatial distribution of the ionized gas and thus the most recent star formation burst, using narrow band filters to image the Halpha line (F665W or F673W). We will also analyze the location and morphology of young stellar populations with the UV filter (F225W). Finally, we will target the redder part of the spectrum (with the F775W filter) to provide with a continuum image to subtract from the Halpha one, and to study the structure of the old stellar populations.

Combining this data with the Chandra observations, we will be able to search for clumps of star formation that are coincident with X-ray emission, and measure its specific properties, which may be different from other clumps. The HST data will also be helpful in determining the presence of an underlying disk, formed by the old stellar population. We will also potentially identify jets, holes, and tails in the ionized gas structure, with implications in the leakage of Lyman radiation. This is a key issue in the analysis of the very high redshift galaxies discovered by JWST (those responsible of the reionization of the Universe), which are analogues to our galaxies. We will obtain a much higher physical spatial resolution that what the JWST reaches at high redshift.

In order to do so, we intend to observe each galaxy during on HST orbit, with three different filters and three exposures in each filter. The different exposures will help us remove cosmic rays or bad pixels and, along with the dithering pattern, sample accurately the PSF. The exposure times of the F225W filter are longer than the other filters, due to the lower sentivity and therefore lower SNR in the bluer wavelengths. To a lesser extent, the F775W filter exposures are shorter than the Halpha filters (F665W or F673W). The exposures are short (114-300 s), but since the targets are relatively bright, we expect to reach high SNR. According to the ETC, we will reach SNR > 20 for 0.2 arcsec apertures in the optical filters, and SNR>10 in the UV.

To improve the efficiency of the observations, and given the small size of the targets (<20 arcsec), we have chosen to read only a sub-array of the CCD. We propose to use UVIS2-C1K1C-SUB for most of the sample, as it is roughly twice the size of the galaxies, and it allows us to extend significantly the exposure times and thus the SNR. For the largets galaxy we use UVIS2-2K2C-SUB, and for the smallest, UVIS2-C512C-SUB. We

use postflash to avoit CTE issues.

The different Halpha filters are chosen depending on the redshift of each target.

The target EELG-6 has already been observed with F775W and F673W to get Halpha, so there is no need to repeat them. We chose to use the remaining time in the orbit to observe it with F547M and F621M to obtain an image of the [OIII]5007+4959 emission line. Combining it with the available Halpha, we will explore the different physical properties in the gas (ionization parameter and metallicity), traced by the [OIII]/Halpha ratio.

Visit

Proposal 17578, EELG1 (01), implementation Fri Jun 14 17:01:01 GMT 2024

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.135 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(1), (2), (3)

Fixed Targets

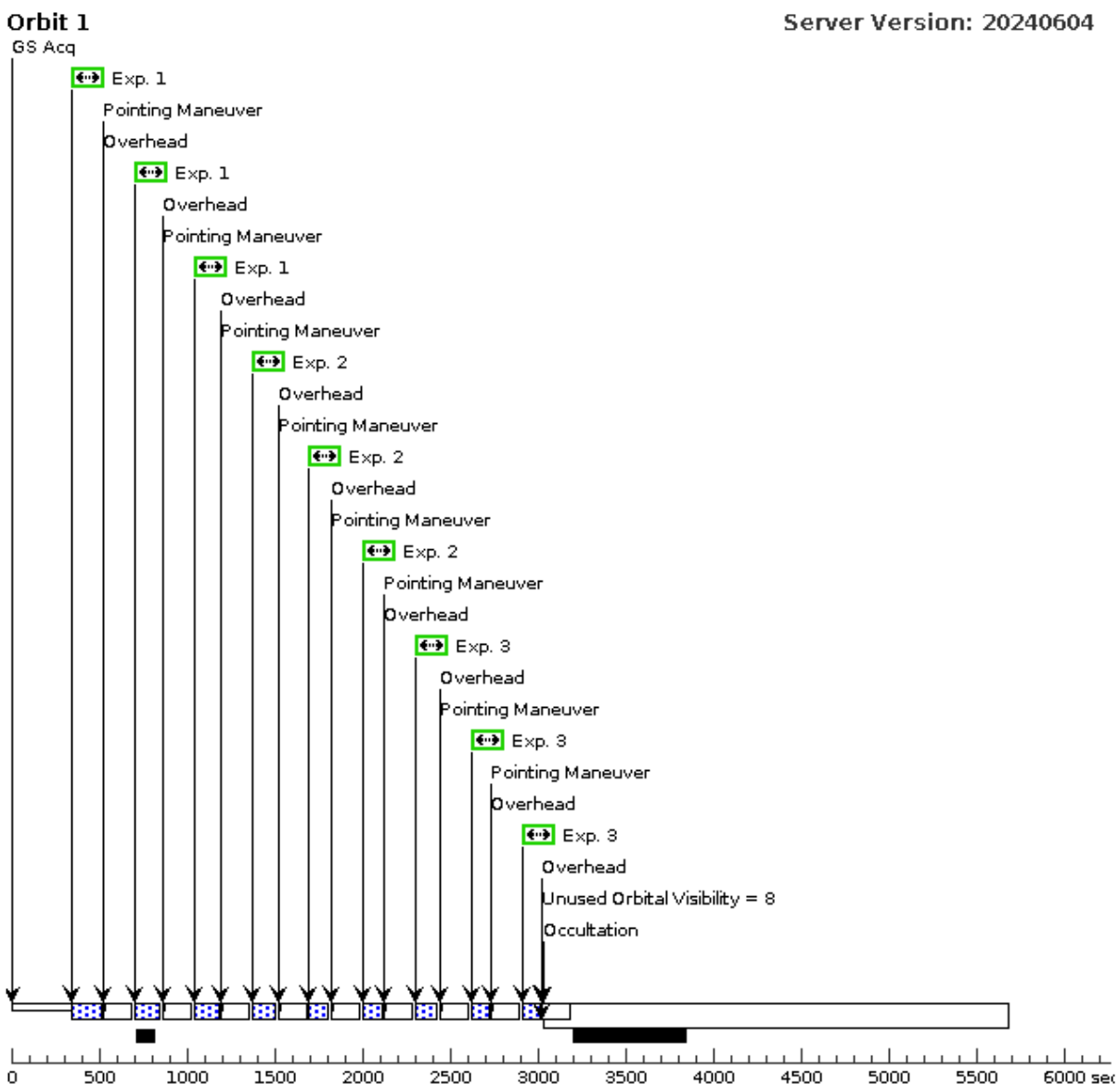
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	J-PLUS-EELG-1	RA: 02 35 31.5300 (38.8813750d) Dec: +32 20 37.87 (32.34385d) Equinox: J2000		V=(?) uJAVA=21.99+-0.08 mag/arcsec^2, Halpha=5.9e-15 erg/s/cm^2/arcsec^2, iSDSS=20.42+-0.01 mag/arcsec^2	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[DWARF COMPACT, EMISSION LINE NEBULA]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F225W_200	(1) J-PLUS-EELG-1	WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB	F225W	FLASH=20		Pattern 1, Exps 1-1 in EELG1 (01) (1)	155 Secs (423 Secs) *[==>141.0 Secs (Pattern 1)]* *[==>141.0 Secs (Pattern 2)]* *[==>141.0 Secs (Pattern 3)]*	***[1]***
2	F665N_150	(1) J-PLUS-EELG-1	WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB	F665N	FLASH=20		Pattern 1, Exps 2-2 in EELG1 (01) (1)	125 Secs (333 Secs) *[==>111.0 Secs (Pattern 1)]* *[==>111.0 Secs (Pattern 2)]* *[==>111.0 Secs (Pattern 3)]*	***[1]***
3	F775W_150	(1) J-PLUS-EELG-1	WFC3/UVIS, ACCUM, UVIS2-2K2C-SUB	F775W	FLASH=20		Pattern 1, Exps 3-3 in EELG1 (01) (1)	114 Secs (300 Secs) *[==>100.0 Secs (Pattern 1)]* *[==>100.0 Secs (Pattern 2)]* *[==>100.0 Secs (Pattern 3)]*	***[1]***

Orbit Structure



Visit

Proposal 17578, EELG2 (02), implementation Fri Jun 14 17:01:01 GMT 2024

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Comments: testing

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.135 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(1), (2), (3)

Fixed Targets

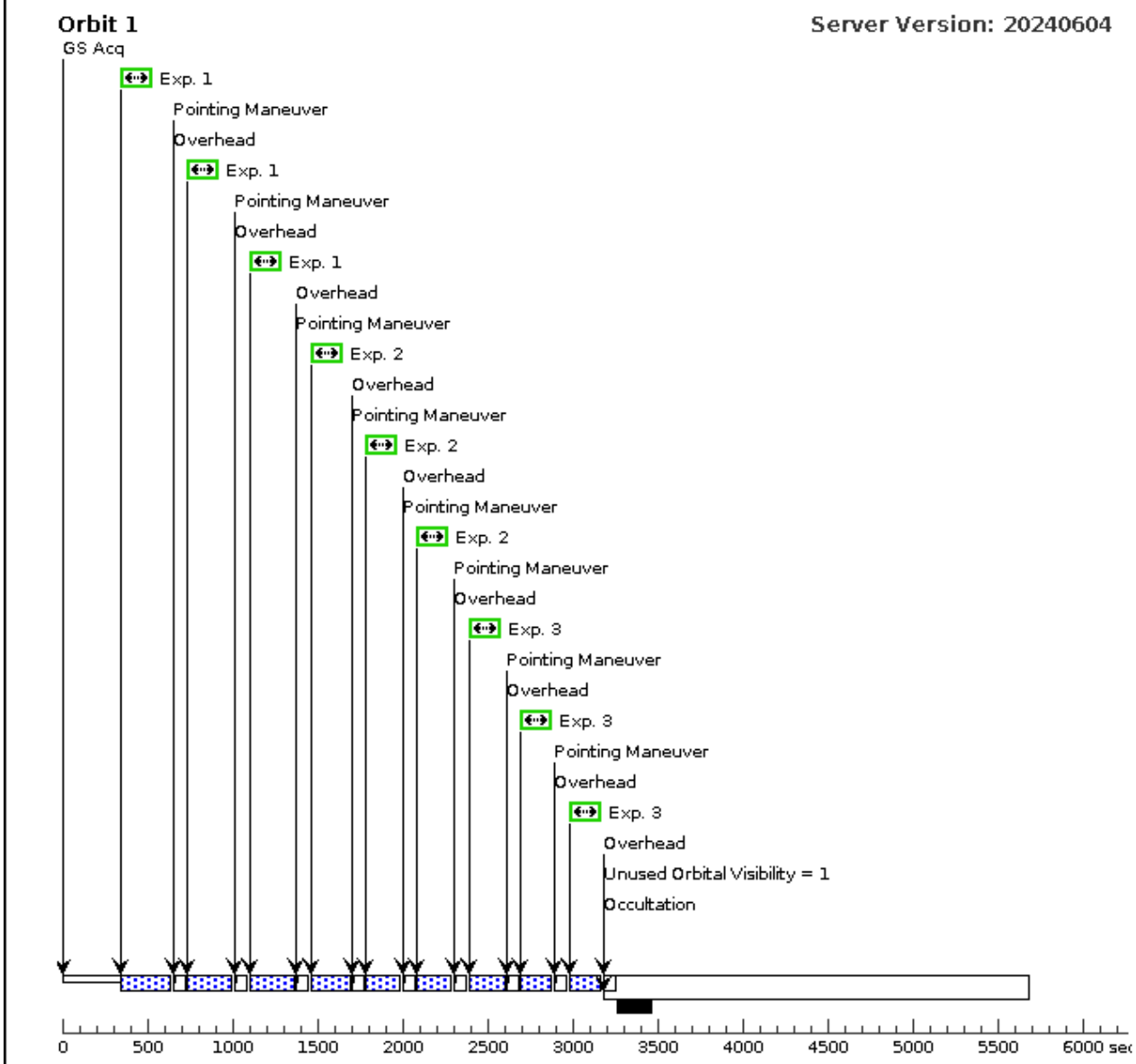
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	J-PLUS-EELG-2	RA: 09 03 4.8000 (135.7700000d) Dec: +72 51 47.36 (72.86316d) Equinox: J2000		V=(?) uJAVA=22.07+-0.08 mag/arcsec^2, Halpha=3.3e-15 erg/s/cm^2/arcsec^2, iSDSS=20.57+-0.01 mag/arcsec^2	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[DWARF COMPACT, EMISSION LINE NEBULA]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F225W_200	(2) J-PLUS-EELG-2	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F225W	FLASH=20		Pattern 1, Exps 1-1 in EELG2 (02) (1)	300 Secs (795 Secs) *[==>265.0 Secs (Pattern 1)]* *[==>265.0 Secs (Pattern 2)]* *[==>265.0 Secs (Pattern 3)]*	***[1]***
2	F665N_150	(2) J-PLUS-EELG-2	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F665N	FLASH=20		Pattern 1, Exps 2-2 in EELG2 (02) (1)	240 Secs (615 Secs) *[==>205.0 Secs (Pattern 1)]* *[==>205.0 Secs (Pattern 2)]* *[==>205.0 Secs (Pattern 3)]*	***[1]***
3	F775W_150	(2) J-PLUS-EELG-2	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F775W	FLASH=18		Pattern 1, Exps 3-3 in EELG2 (02) (1)	220 Secs (555 Secs) *[==>185.0 Secs (Pattern 1)]* *[==>185.0 Secs (Pattern 2)]* *[==>185.0 Secs (Pattern 3)]*	***[1]***

Orbit Structure



Visit

Proposal 17578, EELG3 (03), implementation Fri Jun 14 17:01:01 GMT 2024

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Comments: testing

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.135 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(1), (2), (3)

Fixed Targets

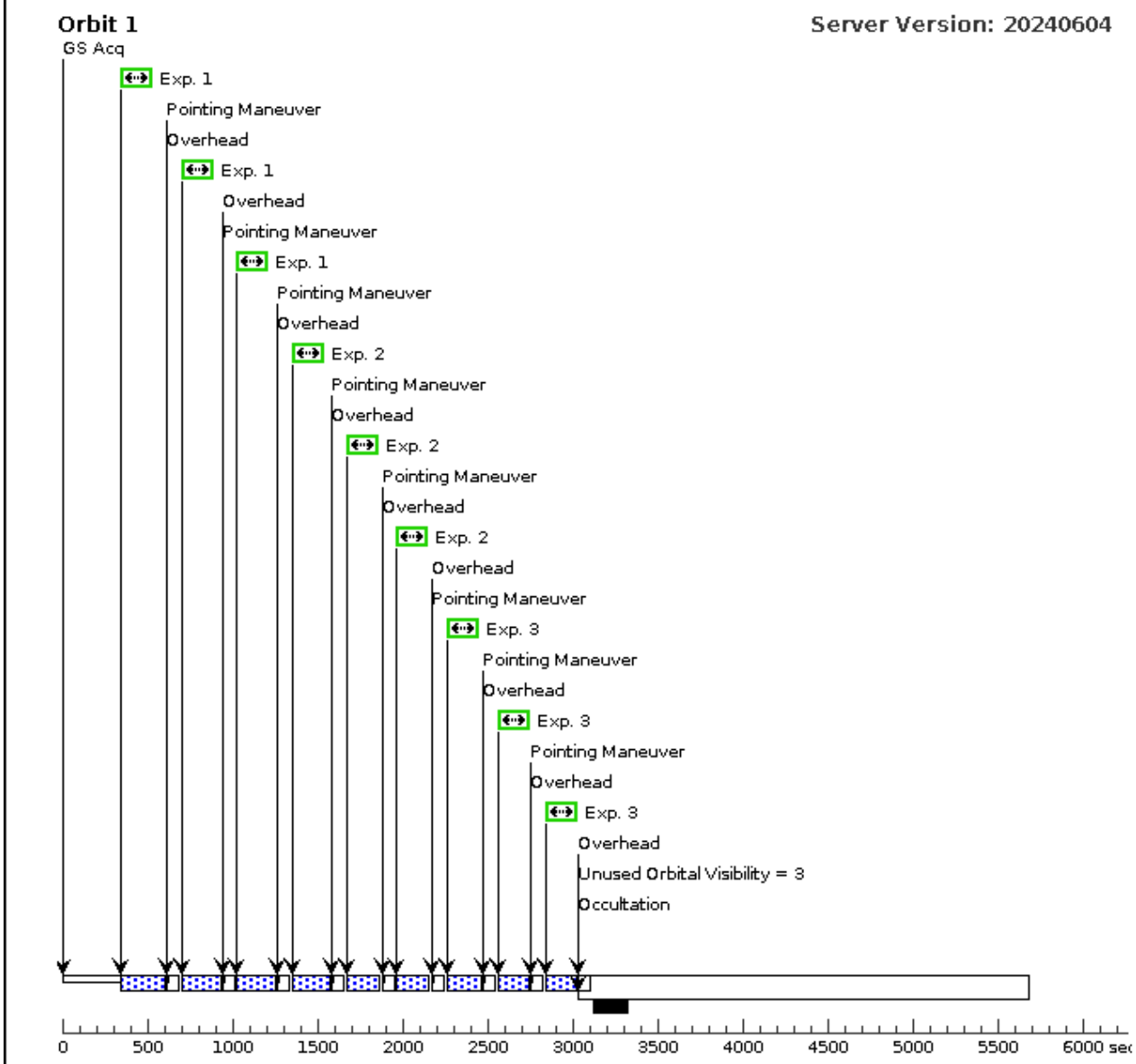
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	J-PLUS-EELG-3	RA: 18 39 57.7000 (279.9904167d) Dec: +38 05 5.22 (38.08478d) Equinox: J2000		V=(?) uJAVA=22.21+-0.13 mag/arcsec^2, Halpha=4.8e-15 erg/s/cm^2/arcsec^2, iSDSS=20.89+-0.03 mag/arcsec^2	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[DWARF COMPACT, EMISSION LINE NEBULA]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F225W_200	(3) J-PLUS-EELG-3	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F225W	FLASH=20		Pattern 1, Exps 1-1 in EELG3 (03) (1)	245 Secs (687 Secs) *[==>229.0 Secs (Pattern 1)]* *[==>229.0 Secs (Pattern 2)]* *[==>229.0 Secs (Pattern 3)]*	***[1]***
2	F665N_150	(3) J-PLUS-EELG-3	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F665N	FLASH=20		Pattern 1, Exps 2-2 in EELG3 (03) (1)	210 Secs (582 Secs) *[==>194.0 Secs (Pattern 1)]* *[==>194.0 Secs (Pattern 2)]* *[==>194.0 Secs (Pattern 3)]*	***[1]***
3	F775W_150	(3) J-PLUS-EELG-3	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F775W	FLASH=18		Pattern 1, Exps 3-3 in EELG3 (03) (1)	195 Secs (537 Secs) *[==>179.0 Secs (Pattern 1)]* *[==>179.0 Secs (Pattern 2)]* *[==>179.0 Secs (Pattern 3)]*	***[1]***

Orbit Structure



Visit

Proposal 17578, EELG4 (04), scheduling Fri Jun 14 17:01:01 GMT 2024

Diagnostic Status: Warning

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Comments: testing

Diagnostics

(EELG4 (04)) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.135 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(1), (2), (3)

Fixed Targets

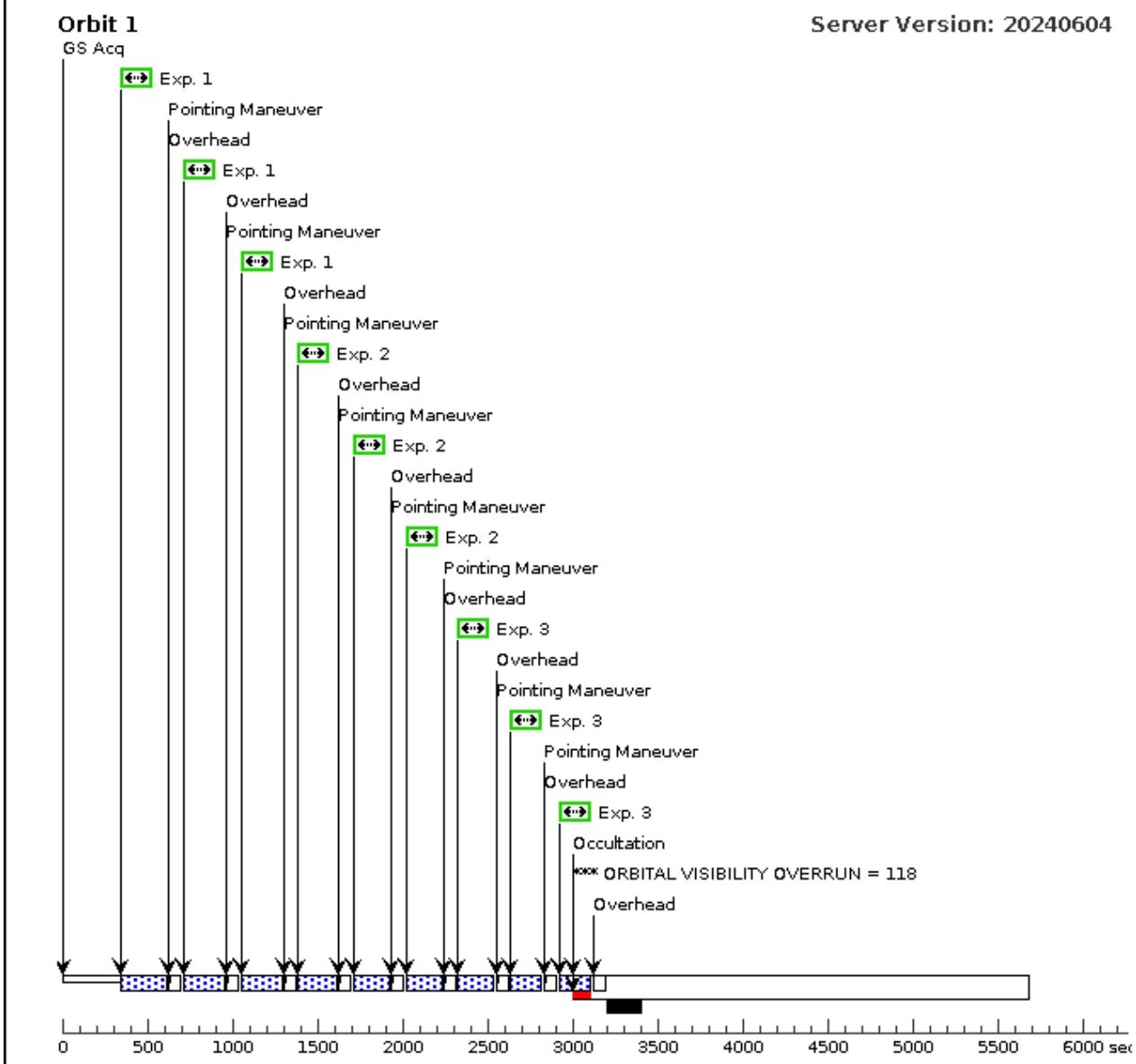
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(4)	J-PLUS-EELG-4	RA: 01 38 22.6000 (24.5941667d) Dec: +01 54 2.30 (1.90064d) Equinox: J2000		V=(?) uJAVA=22.5+-0.18 mag/arcsec^2, Halpha=1.5e-15 erg/s/cm^2/arcsec^2, iSDSS=21.18+-0.03 mag/arcsec^2	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[DWARF COMPACT, EMISSION LINE NEBULA]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F225W_200	(4) J-PLUS-EELG-4	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F225W	FLASH=20		Pattern 1, Exps 1-1 in EELG4 (04) (1)	240 Secs (720 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[1]***
2	F673N_150	(4) J-PLUS-EELG-4	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F673N	FLASH=20		Pattern 1, Exps 2-2 in EELG4 (04) (1)	210 Secs (630 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[1]***
3	F775W_150	(4) J-PLUS-EELG-4	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F775W	FLASH=18		Pattern 1, Exps 3-3 in EELG4 (04) (1)	185 Secs (555 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[1]***

Orbit Structure



Visit

Proposal 17578, EELG5 (05), implementation Fri Jun 14 17:01:01 GMT 2024

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Comments: testing

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.135 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(1), (2), (3)

Fixed Targets

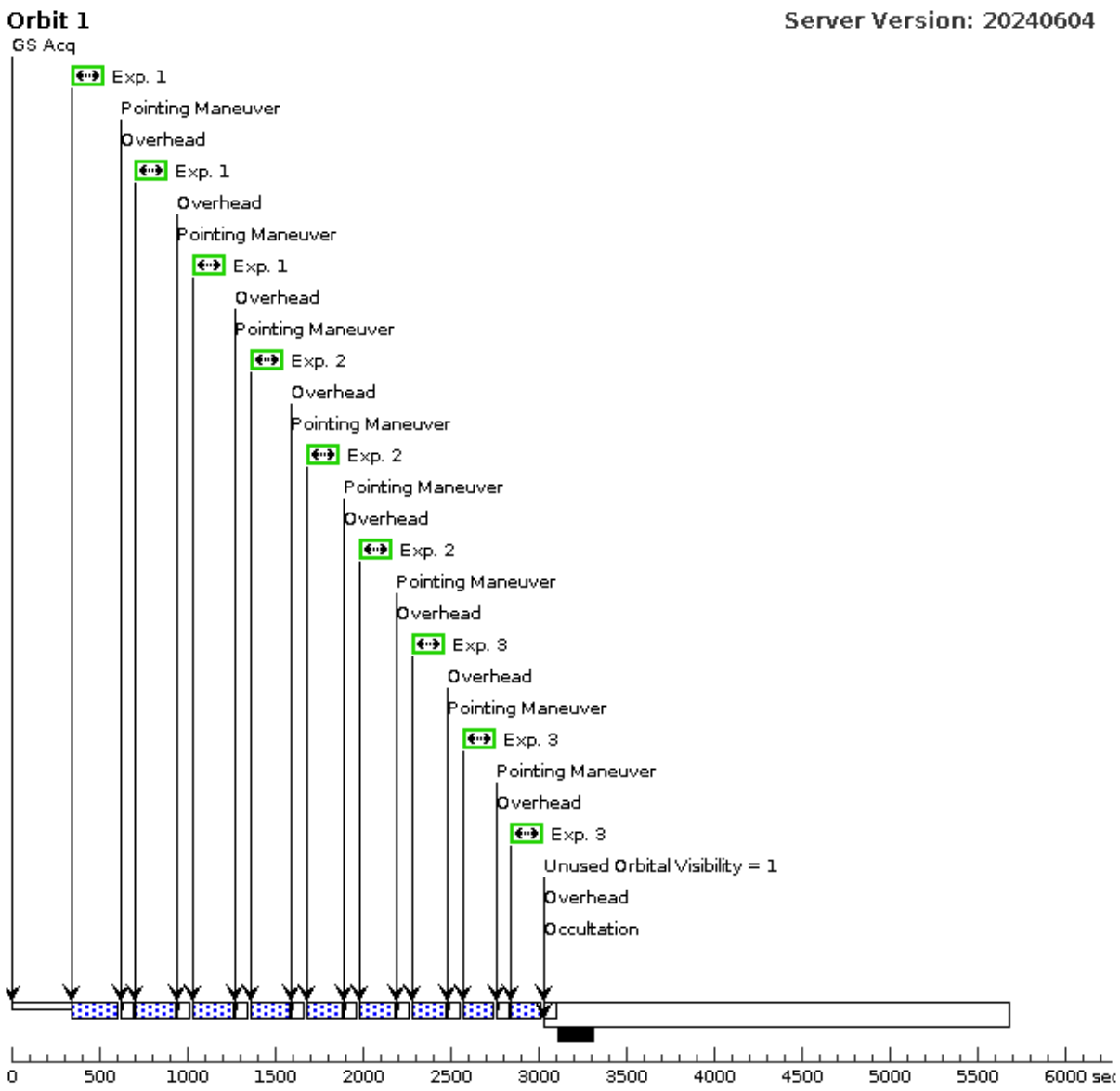
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(5)	J-PLUS-EELG-5	RA: 13 25 49.4000 (201.4558333d) Dec: +33 03 54.40 (33.06511d) Equinox: J2000		V=(?) uJAVA=21.1+-0.05 mag/arcsec^2, Halpha=7.8e-15 erg/s/cm^2/arcsec^2, iSDSS=20.33+-0.01 mag/arcsec^2	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[DWARF COMPACT, EMISSION LINE NEBULA]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F225W_200	(5) J-PLUS-EELG-5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F225W	FLASH=20		Pattern 1, Exps 1-1 in EELG5 (05) (1)	245 Secs (696 Secs) *[==>232.0 Secs (Pattern 1)]* *[==>232.0 Secs (Pattern 2)]* *[==>232.0 Secs (Pattern 3)]*	***[1]***
2	F665N_150	(5) J-PLUS-EELG-5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F665N	FLASH=20		Pattern 1, Exps 2-2 in EELG5 (05) (1)	210 Secs (591 Secs) *[==>197.0 Secs (Pattern 1)]* *[==>197.0 Secs (Pattern 2)]* *[==>197.0 Secs (Pattern 3)]*	***[1]***
3	F775W_150	(5) J-PLUS-EELG-5	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F775W	FLASH=18		Pattern 1, Exps 3-3 in EELG5 (05) (1)	185 Secs (516 Secs) *[==>172.0 Secs (Pattern 1)]* *[==>172.0 Secs (Pattern 2)]* *[==>172.0 Secs (Pattern 3)]*	***[1]***

Orbit Structure



Visit

Proposal 17578, EELG6 (06), implementation Fri Jun 14 17:01:01 GMT 2024

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Comments: testing

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.135 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(1), (2), (3)

Fixed Targets

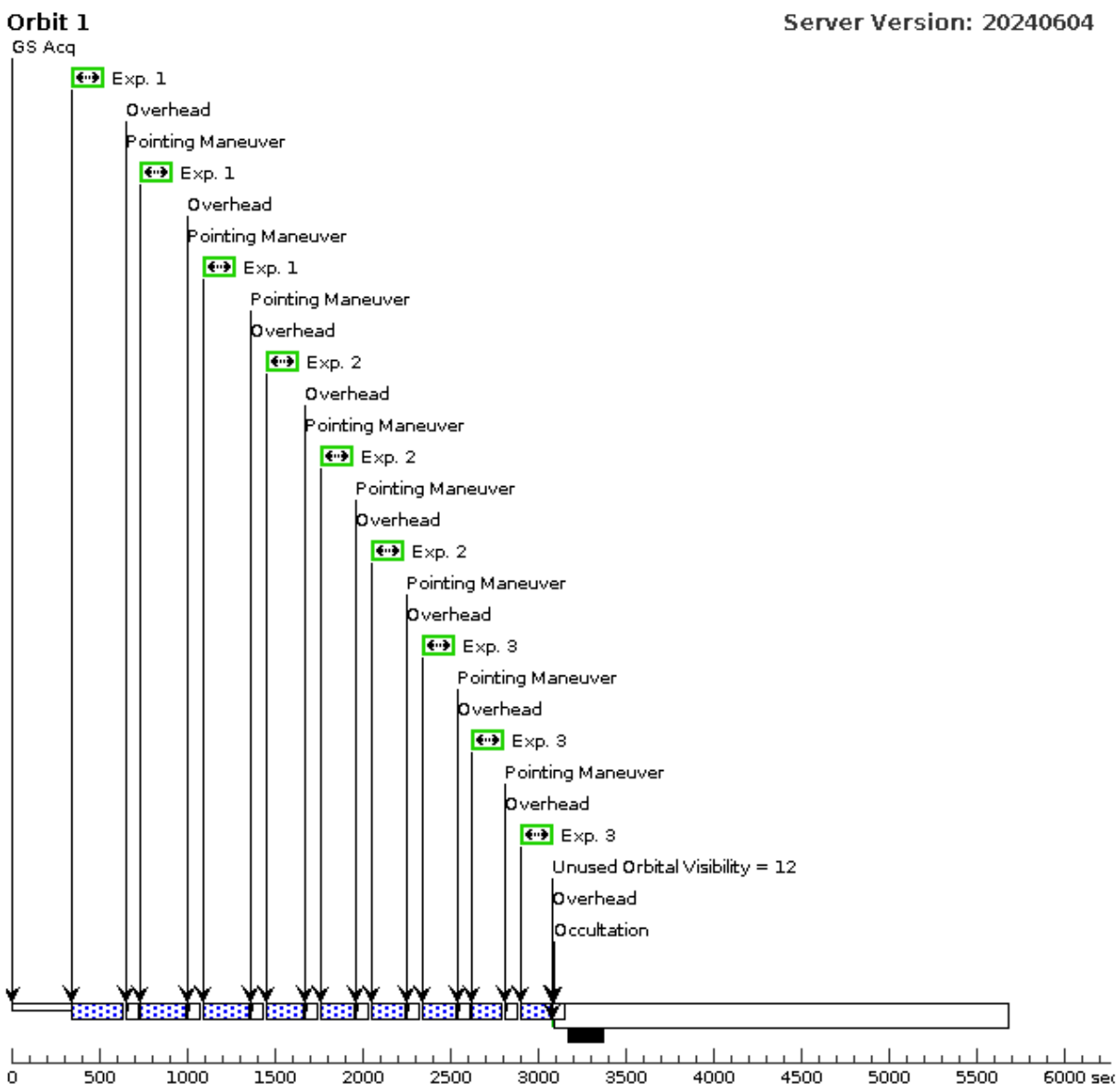
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(6)	J-PLUS-EELG-6	RA: 13 59 50.9000 (209.9620833d) Dec: +57 26 23.00 (57.43972d) Equinox: J2000		V=(?) uJAVA=20.44+-0.02 mag/arcsec^2, Halpha=6.7e-15 erg/s/cm^2/arcsec^2, iSDSS=20.08+-0.01 mag/arcsec^2	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[DWARF COMPACT, EMISSION LINE NEBULA]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F225W_200	(6) J-PLUS-EELG-6	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F225W	FLASH=20		Pattern 1, Exps 1-1 in EELG6 (06) (1)	295 Secs (786 Secs) *[==>262.0 Secs (Pattern 1)]* *[==>262.0 Secs (Pattern 2)]* *[==>262.0 Secs (Pattern 3)]*	***[1]***
2	F547M_150	(6) J-PLUS-EELG-6	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F547M	FLASH=20		Pattern 1, Exps 2-2 in EELG6 (06) (1)	220 Secs (561 Secs) *[==>187.0 Secs (Pattern 1)]* *[==>187.0 Secs (Pattern 2)]* *[==>187.0 Secs (Pattern 3)]*	***[1]***
3	F621M_150	(6) J-PLUS-EELG-6	WFC3/UVIS, ACCUM, UVIS2-C1K1C-SUB	F621M	FLASH=18		Pattern 1, Exps 3-3 in EELG6 (06) (1)	205 Secs (516 Secs) *[==>172.0 Secs (Pattern 1)]* *[==>172.0 Secs (Pattern 2)]* *[==>172.0 Secs (Pattern 3)]*	***[1]***

Orbit Structure



Visit

Proposal 17578, EELG7 (07), implementation Fri Jun 14 17:01:01 GMT 2024

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Comments: testing

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.135 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(1), (2), (3)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(7)	J-PLUS-EELG-7	RA: 18 54 53.2000 (283.7216667d) Dec: +32 26 11.21 (32.43645d) Equinox: J2000		V=(?) uJAVA=25.35+-1.68 mag/arcsec^2, Halpha=5.8e-16 erg/s/cm^2/arcsec^2, iSDSS=23.51+-0.19 mag/arcsec^2	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[DWARF COMPACT, EMISSION LINE NEBULA]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F225W_200	(7) J-PLUS-EELG-7	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F225W	FLASH=20		Pattern 1, Exps 1-1 in EELG7 (07) (1)	280 Secs (798 Secs) *[==>266.0 Secs (Pattern 1)]* *[==>266.0 Secs (Pattern 2)]* *[==>266.0 Secs (Pattern 3)]*	***[1]***
2	F673N_150	(7) J-PLUS-EELG-7	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F673N	FLASH=20		Pattern 1, Exps 2-2 in EELG7 (07) (1)	240 Secs (678 Secs) *[==>226.0 Secs (Pattern 1)]* *[==>226.0 Secs (Pattern 2)]* *[==>226.0 Secs (Pattern 3)]*	***[1]***
3	F775W_150	(7) J-PLUS-EELG-7	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F775W	FLASH=18		Pattern 1, Exps 3-3 in EELG7 (07) (1)	225 Secs (633 Secs) *[==>211.0 Secs (Pattern 1)]* *[==>211.0 Secs (Pattern 2)]* *[==>211.0 Secs (Pattern 3)]*	***[1]***

Orbit Structure