15692 - HST imaging for an immediate study of the ISM in z=4.5 galaxies

Cycle: 26, 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) DEIMOS-COSMOS-787780	WFC3/IR	1	12-Apr-2019 19:58:21.0	yes
02	(2) DEIMOS-COSMOS-818760	WFC3/IR	1	12-Apr-2019 19:58:22.0	yes
03	(3) DEIMOS-COSMOS-396844	WFC3/IR	1	12-Apr-2019 19:58:24.0	yes
04	(4) VUDS-COSMOS-5101209780	WFC3/IR	1	12-Apr-2019 19:58:25.0	yes
05	(5) VUDS-COSMOS-5180966608	WFC3/IR	1	12-Apr-2019 19:58:26.0	yes
06	(6) VUDS-COSMOS-5101218326	WFC3/IR	1	12-Apr-2019 19:58:27.0	yes

6 Total Orbits Used

ABSTRACT

The redshift range 4<z<6 is a key epoch to study galaxy formation and evolution as galaxies transition from a primordial to a mature state. Several studies suggest that the interstellar medium (ISM) of such galaxies is more complex then anticipated. Likely reasons are galaxy interactions and radiation pressure from highly star-forming regions, causing spatial offsets between UV (stars), far-IR (FIR, dust), and [CII] (158um, gas) emission. A detailed study of these offsets results in improved understanding of the dust distribution, which leads to better dust correction of the UV light (usually the only wavelength studied at z>4), and important insights into the star-formation properties of early galaxies.

The synergy of HST and ALMA (probing different wavelengths at similar resolution) is powerful to carry out a detailed resolved multi-wavelength study of the ISM. We selected 6 galaxies at z=4.5 with extended FIR and [CII] emission of complex morphology from brand-new ALMA data. Furthermore, ACS/F814W data suggests clumpy UV emission or galaxy mergers. We propose for F105W+F160W imaging to provide the crucial deep UV coverage and resolution to complete the spatially resolved multi-wavelength analysis of these precious galaxies for which currently only low-resolution ground-based near-IR data is available.

These observations allow us to

(i) constrain the UV continnum on kpc scales to study, together with FIR continuum, the distribution of dust,

(ii) quantify the amount of dust-obscured star-formation at z>4, and
(iii) spatially correlate [CII] emission and star-formation.
This program builds an immediate basis for follow-up with ALMA, JVLA, and JWST.

OBSERVING DESCRIPTION

We observe 6 galaxies in 6 separate pointings and visits. Each pointing/visit has exposures in F105W and F160W totalling 1 orbit including overheads. We use separate visits for each pointing as these are distributed over a large area on the COSMOS field.

To easy scheduling, we do not request special observation requirements for the 6 pointings. However, ideally an execution of visits at a similar time within a few weeks would be appreciated.

Detailed observation plan:
Each pointing is imaged in 4 dither positions times two filters in 1 full orbit (53 minutes total visibility).
We use the MULTIACCUM mode with NSAMP=7 and SPARS50, which adds up to 4*303s=1212s per filter. These settings are chosen for optimal CR rejection and best image quality at the center of the pointing where the targeted galaxy is located.
To use the telescope efficiently with little pointing maneuvers, we observe in groups of (F105W+F160W). Furthermore, we switch the orders of the filters in the group to minimize filter changes. This has also the advantage that we avoid observing with F105W at the beginning and end of the orbit at lower limb angles for the earth, thus possible brighter variable HeII emission which can contaminate that filter.

Our dither pattern is manually designed for optimal spacecraft movement, to minimize overheads, and is based on a hybrid combination of the "WFC3-IR-DITHER-BLOB" pattern (with spacing large enough to move around detector defects such as the deathstar and flatfield blobs), along with features from the "WFC3-IR-DITHER-BOX-MIN" pattern that provides full 0.5-pixel subsampling in both x and y, in a 4-point pattern. While the size of the dither offsets may result in some variation in sub-pixel sampling across the detector (due to the distortion in the WFC3/IR camera), this is not as crucial for our science as the need to obtain clean images free of detector defects, and our targets of interest near the centre of the detector will in any case remain well-sampled.

Total Time Request. Including overheads, we need 1 orbit per pointing for two filters, hence we are requesting a total time of 6 orbits for this program.

Visit

Proposal 15692, Visit 01 Fri Apr 12 23:58:27 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: (none)

Fixed Targets

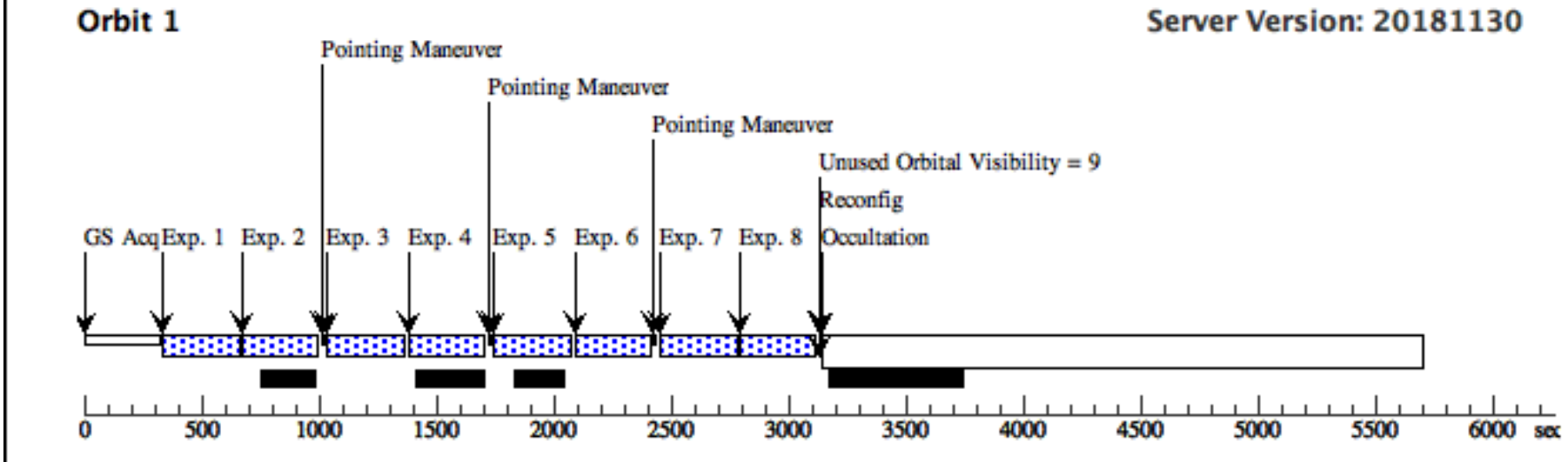
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	DEIMOS-COSMOS-787780	RA: 09 59 56.6751 (149.9861462d) Dec: +02 29 48.08 (2.49669d) Equinox: J2000		V=(?) H = 24.2AB (3" aperture)	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[HIGH REDSHIFT GALAXY]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) DEIMOS-COSMOS-787780	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=7; SAMP-SEQ=SPARS50	POS TARG 0,0		302.934997 Secs (302.935 Secs) *[==>]*	***[1]***
2		(1) DEIMOS-COSMOS-787780	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=7; SAMP-SEQ=SPARS50	SAME POS AS 1		302.934997 Secs (302.935 Secs) *[==>]*	***[1]***
3		(1) DEIMOS-COSMOS-787780	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=7; SAMP-SEQ=SPARS50	POS TARG -1.8970 0,4.17795		302.934997 Secs (302.935 Secs) *[==>]*	***[1]***
4		(1) DEIMOS-COSMOS-787780	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=7; SAMP-SEQ=SPARS50	SAME POS AS 3		302.934997 Secs (302.935 Secs) *[==>]*	***[1]***
5		(1) DEIMOS-COSMOS-787780	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=7; SAMP-SEQ=SPARS50	POS TARG -5.8942 5,2.36145		302.934997 Secs (302.935 Secs) *[==>]*	***[1]***
6		(1) DEIMOS-COSMOS-787780	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=7; SAMP-SEQ=SPARS50	SAME POS AS 5		302.934997 Secs (302.935 Secs) *[==>]*	***[1]***
7		(1) DEIMOS-COSMOS-787780	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=7; SAMP-SEQ=SPARS50	POS TARG -4.1327 5,-1.69540		302.934997 Secs (302.935 Secs) *[==>]*	***[1]***
8		(1) DEIMOS-COSMOS-787780	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=7; SAMP-SEQ=SPARS50	SAME POS AS 7		302.934997 Secs (302.935 Secs) *[==>]*	***[1]***

Orbit Structure



Visit

Proposal 15692, Visit 02 Fri Apr 12 23:58:28 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: (none)

Fixed Targets

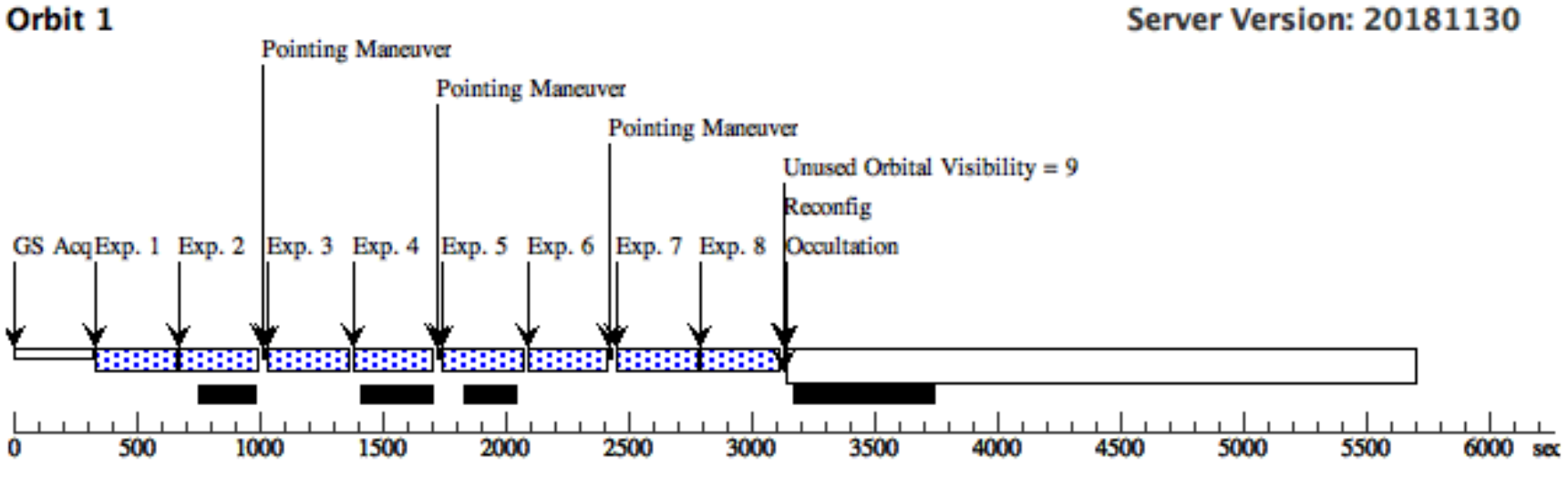
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	DEIMOS-COSMOS-818760	RA: 10 01 54.8644 (150.4786017d) Dec: +02 32 31.54 (2.54209d) Equinox: J2000		V=(?) H = 23.2AB (3" aperture)	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[HIGH REDSHIFT GALAXY]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(2) DEIMOS-COSMOS-818760	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=7; SAMP-SEQ=SPARS50	POS TARG 0,0		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***
2		(2) DEIMOS-COSMOS-818760	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=7; SAMP-SEQ=SPARS50	SAME POS AS 1		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***
3		(2) DEIMOS-COSMOS-818760	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=7; SAMP-SEQ=SPARS50	POS TARG -1.89700,4.17795		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***
4		(2) DEIMOS-COSMOS-818760	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=7; SAMP-SEQ=SPARS50	SAME POS AS 3		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***
5		(2) DEIMOS-COSMOS-818760	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=7; SAMP-SEQ=SPARS50	POS TARG -5.89425,2.36145		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***
6		(2) DEIMOS-COSMOS-818760	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=7; SAMP-SEQ=SPARS50	SAME POS AS 5		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***
7		(2) DEIMOS-COSMOS-818760	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=7; SAMP-SEQ=SPARS50	POS TARG -4.13275,-1.69540		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***
8		(2) DEIMOS-COSMOS-818760	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=7; SAMP-SEQ=SPARS50	SAME POS AS 7		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***

Orbit Structure



Visit

Proposal 15692, Visit 03 Fri Apr 12 23:58:28 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: (none)

Fixed Targets

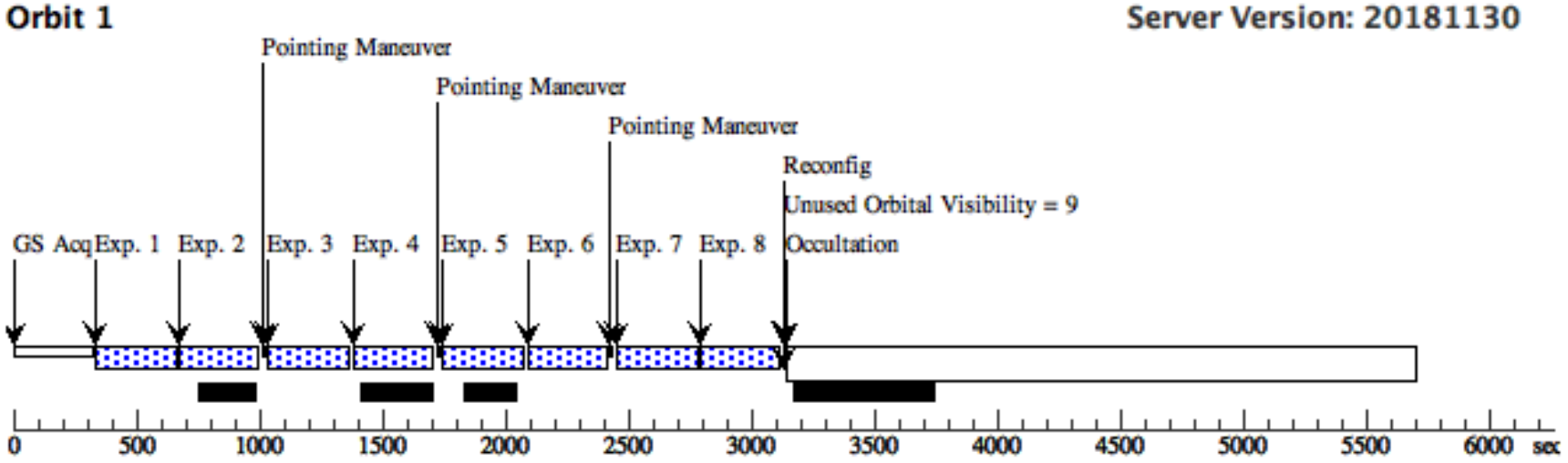
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	DEIMOS-COSMOS-396844	RA: 10 00 59.6379 (150.2484913d) Dec: +01 53 47.45 (1.89651d) Equinox: J2000		V=(?) H = 24.6AB (3" aperture)	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[HIGH REDSHIFT GALAXY]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(3) DEIMOS-COSMOS-396844	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=7; SAMP-SEQ=SPARS50	POS TARG 0,0		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***
2		(3) DEIMOS-COSMOS-396844	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=7; SAMP-SEQ=SPARS50	SAME POS AS 1		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***
3		(3) DEIMOS-COSMOS-396844	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=7; SAMP-SEQ=SPARS50	POS TARG -1.8970 0,4.17795		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***
4		(3) DEIMOS-COSMOS-396844	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=7; SAMP-SEQ=SPARS50	SAME POS AS 3		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***
5		(3) DEIMOS-COSMOS-396844	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=7; SAMP-SEQ=SPARS50	POS TARG -5.8942 5,2.36145		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***
6		(3) DEIMOS-COSMOS-396844	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=7; SAMP-SEQ=SPARS50	SAME POS AS 5		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***
7		(3) DEIMOS-COSMOS-396844	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=7; SAMP-SEQ=SPARS50	POS TARG -4.1327 5,-1.69540		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***
8		(3) DEIMOS-COSMOS-396844	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=7; SAMP-SEQ=SPARS50	SAME POS AS 7		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***

Orbit Structure



Visit

Proposal 15692, Visit 04 Fri Apr 12 23:58:28 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: (none)

Fixed Targets

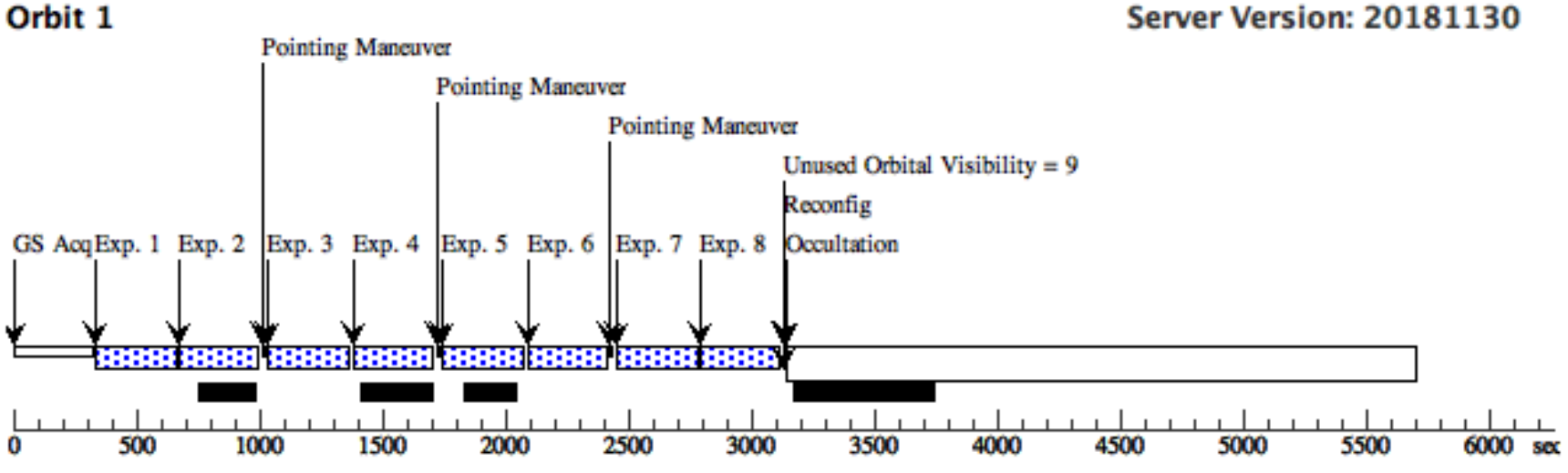
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(4)	VUDS-COSMOS-5101209780	RA: 10 01 33.4507 (150.3893779d) Dec: +02 22 10.11 (2.36947d) Equinox: J2000		V=(?) H = 23.7AB (3" aperture)	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[HIGH REDSHIFT GALAXY]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(4) VUDS-COSMOS-5101209780	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=7; SAMP-SEQ=SPARS50	POS TARG 0,0		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***
2		(4) VUDS-COSMOS-5101209780	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=7; SAMP-SEQ=SPARS50	SAME POS AS 1		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***
3		(4) VUDS-COSMOS-5101209780	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=7; SAMP-SEQ=SPARS50	POS TARG -1.8970 0,4.17795		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***
4		(4) VUDS-COSMOS-5101209780	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=7; SAMP-SEQ=SPARS50	SAME POS AS 3		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***
5		(4) VUDS-COSMOS-5101209780	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=7; SAMP-SEQ=SPARS50	POS TARG -5.8942 5,2.36145		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***
6		(4) VUDS-COSMOS-5101209780	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=7; SAMP-SEQ=SPARS50	SAME POS AS 5		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***
7		(4) VUDS-COSMOS-5101209780	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=7; SAMP-SEQ=SPARS50	POS TARG -4.1327 5,-1.69540		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***
8		(4) VUDS-COSMOS-5101209780	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=7; SAMP-SEQ=SPARS50	SAME POS AS 7		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***

Orbit Structure



Visit

Proposal 15692, Visit 05 Fri Apr 12 23:58:28 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: (none)

Fixed Targets

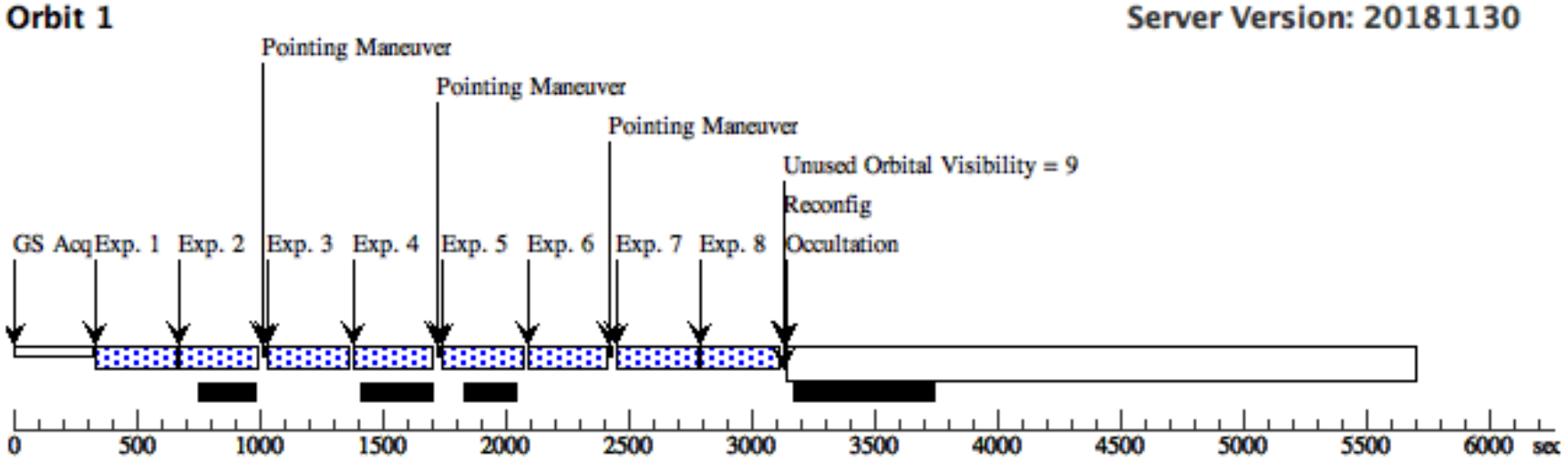
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(5)	VUDS-COSMOS-5180966608	RA: 10 01 37.4671 (150.4061129d) Dec: +02 08 23.54 (2.13987d) Equinox: J2000		V=(?) H = 24.0AB (3" aperture)	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[HIGH REDSHIFT GALAXY]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(5) VUDS-COSMOS-5180966608	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=7; SAMP-SEQ=SPARS50	POS TARG 0,0		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***
2		(5) VUDS-COSMOS-5180966608	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=7; SAMP-SEQ=SPARS50	SAME POS AS 1		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***
3		(5) VUDS-COSMOS-5180966608	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=7; SAMP-SEQ=SPARS50	POS TARG -1.8970 0,4.17795		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***
4		(5) VUDS-COSMOS-5180966608	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=7; SAMP-SEQ=SPARS50	SAME POS AS 3		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***
5		(5) VUDS-COSMOS-5180966608	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=7; SAMP-SEQ=SPARS50	POS TARG -5.8942 5,2.36145		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***
6		(5) VUDS-COSMOS-5180966608	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=7; SAMP-SEQ=SPARS50	SAME POS AS 5		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***
7		(5) VUDS-COSMOS-5180966608	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=7; SAMP-SEQ=SPARS50	POS TARG -4.1327 5,-1.69540		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***
8		(5) VUDS-COSMOS-5180966608	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=7; SAMP-SEQ=SPARS50	SAME POS AS 7		302.934997 Secs (302.935 Secs) *[==>]*	 ***[1]***

Orbit Structure



Visit

Proposal 15692, Visit 06

Fri Apr 12 23:58:28 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: (none)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(6)	VUDS-COSMOS-5101218326	RA: 10 01 12.5078 (150.3021158d) Dec: +02 18 52.57 (2.31460d) Equinox: J2000		V=(?) H = 22.7AB (3" aperture)	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[HIGH REDSHIFT GALAXY]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(6) VUDS-COSMOS-5101218326	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=7; SAMP-SEQ=SPARS50	POS TARG 0,0		302.934997 Secs (302.935 Secs) *[==>]*	*[1]*
2		(6) VUDS-COSMOS-5101218326	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=7; SAMP-SEQ=SPARS50	SAME POS AS 1		302.934997 Secs (302.935 Secs) *[==>]*	*[1]*
3		(6) VUDS-COSMOS-5101218326	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=7; SAMP-SEQ=SPARS50	POS TARG -1.8970 0,4.17795		302.934997 Secs (302.935 Secs) *[==>]*	*[1]*
4		(6) VUDS-COSMOS-5101218326	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=7; SAMP-SEQ=SPARS50	SAME POS AS 3		302.934997 Secs (302.935 Secs) *[==>]*	*[1]*
5		(6) VUDS-COSMOS-5101218326	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=7; SAMP-SEQ=SPARS50	POS TARG -5.8942 5,2.36145		302.934997 Secs (302.935 Secs) *[==>]*	*[1]*
6		(6) VUDS-COSMOS-5101218326	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=7; SAMP-SEQ=SPARS50	SAME POS AS 5		302.934997 Secs (302.935 Secs) *[==>]*	*[1]*
7		(6) VUDS-COSMOS-5101218326	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=7; SAMP-SEQ=SPARS50	POS TARG -4.1327 5,-1.69540		302.934997 Secs (302.935 Secs) *[==>]*	*[1]*
8		(6) VUDS-COSMOS-5101218326	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=7; SAMP-SEQ=SPARS50	SAME POS AS 7		302.934997 Secs (302.935 Secs) *[==>]*	*[1]*

Orbit Structure