



13564 - IR gain monitor

Cycle: 21, Proposal Category: CAL/WFC3

(Availability Mode: RESTRICTED)

INVESTIGATORS

<i>Name</i>	<i>Institution</i>	<i>E-Mail</i>
Mr. Bryan Hilbert (PI) (Contact)	Space Telescope Science Institute	hilbert@stsci.edu
Dr. Sylvia M. Baggett (CoI) (Contact)	Space Telescope Science Institute	sbaggett@stsci.edu
Heather Gunning (CoI) (Contact)	Space Telescope Science Institute	gunning@stsci.edu

VISITS

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	DARK TUNGSTEN	WFC3/IR	1	02-Oct-2013 22:26:06.0	yes
02	DARK TUNGSTEN	WFC3/IR	1	02-Oct-2013 22:26:12.0	yes
03	DARK TUNGSTEN	WFC3/IR	1	02-Oct-2013 22:26:16.0	yes
04	DARK TUNGSTEN	WFC3/IR	1	02-Oct-2013 22:26:19.0	yes
05	DARK TUNGSTEN	WFC3/IR	1	02-Oct-2013 22:26:23.0	yes
06	DARK TUNGSTEN	WFC3/IR	1	02-Oct-2013 22:26:26.0	yes
07	DARK TUNGSTEN	WFC3/IR	1	02-Oct-2013 22:26:30.0	yes

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
08	DARK TUNGSTEN	WFC3/IR	1	02-Oct-2013 22:26:33.0	yes
09	DARK TUNGSTEN	WFC3/IR	1	02-Oct-2013 22:26:37.0	yes
10	DARK TUNGSTEN	WFC3/IR	1	02-Oct-2013 22:26:41.0	yes
11	DARK TUNGSTEN	WFC3/IR	1	02-Oct-2013 22:26:44.0	yes
12	DARK TUNGSTEN	WFC3/IR	1	02-Oct-2013 22:26:47.0	yes
13	DARK TUNGSTEN	WFC3/IR	1	02-Oct-2013 22:26:50.0	yes
14	DARK TUNGSTEN	WFC3/IR	1	02-Oct-2013 22:26:54.0	yes
15	DARK TUNGSTEN	WFC3/IR	1	02-Oct-2013 22:26:57.0	yes
16	DARK TUNGSTEN	WFC3/IR	1	02-Oct-2013 22:27:00.0	yes

16 Total Orbits Used

ABSTRACT

The gain of the IR channel of WFC3 will be measured using a series of internal flat fields. Using knowledge gained from ground testing and previous cycles, we propose to collect flat field ramps which will be used to create photon transfer curves and give a measure of the gain. This continues the strategy of last cycle's gain monitor, in proposal 13080.

OBSERVING DESCRIPTION

Each of the 16 1-orbit Visits are identical. A Visit begins with a short dark current observation. This is done in order to move the BLANK into position before the Tungsten lamp is turned on. We wish to avoid the situation where the Tungsten lamp is on and a grism or wide band filter rotates through the beam, as this is a potential source of persistence. The dark ramp will also serve as a check on any persistence signal present in the detector prior to our observations. After the dark ramp, the Tungsten lamp is turned on and we collect a short flat field observation. Results from

Cycle 17 tests have shown that the Tungsten lamp requires 40 to 50 seconds in addition to the time given at the moment in to reach a stable flux output. The purpose of this short flat is to give the lamp time to reach equilibrium, as our data analysis depends on a linear signal reaching the detector for the duration of the observation. With a narrow band filter in the beam, this short flat should not trigger persistence. It can also be used to further monitor the lamp warm-up time. Finally, we collect a longer flat field ramp, which will be used for the gain calculation. This flat is designed to collect ~14,000 DN per pixel, which is roughly half of full well. This minimizes the non-linearity correction we need to make during data analysis, as well as limits the persistence on the detector that may be seen by the following observer.

In order to limit self-induced persistence, we have also set up the Visits so that they are not back-to-back. Cycle 17 data indicate that for these signal levels, persistence affects the measured signal rate (at the 0.5% level or above) for roughly 100 seconds after the observation has completed. By not having the Visits in this proposal occur consecutively, we hope to give this persistence time to relax between observations.

CALIBRATION JUSTIFICATION

The commanded gain for WFC3-IR is 2.5 e-/ADU. However, for proper calibration and data reduction of science data, we must measure the actual gain in the IR channel. By collecting flat field data, we can generate photon transfer curves, measure the true gain of the system, and propagate these values into the data reduction pipeline for WFC3-IR. This will provide the proper factor for converting science data into units of electrons.

ADDITIONAL COMMENTS

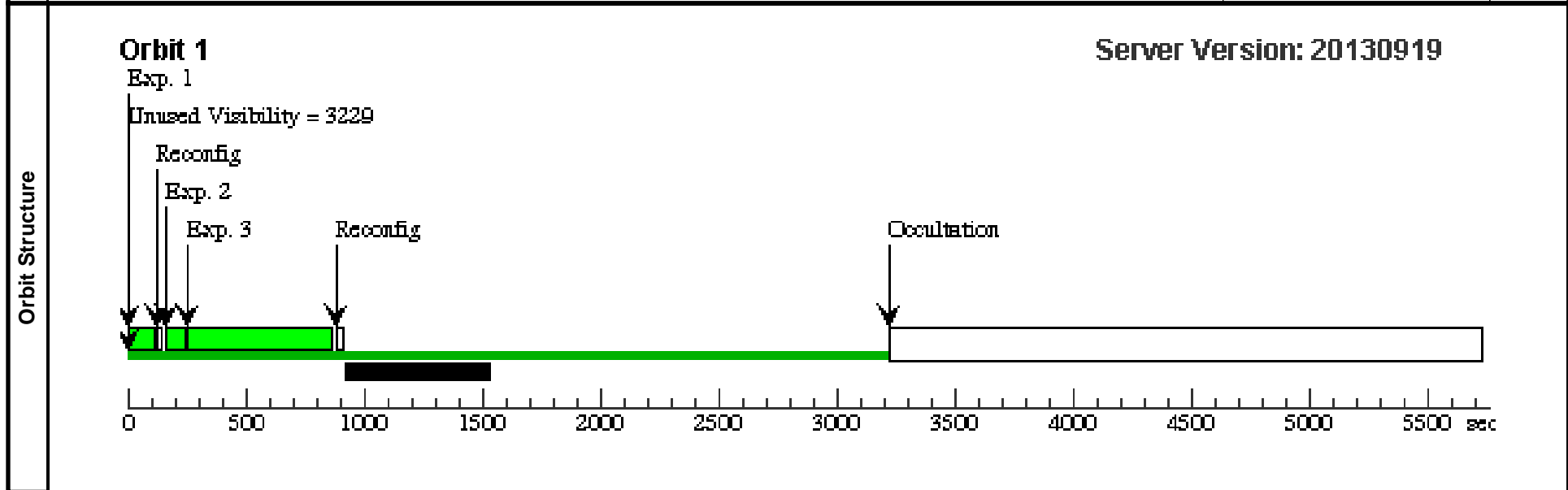
Gain values for each quadrant of the detector will be calculated separately using pairs of ramps. From a given pair of ramps, we will construct a photon transfer curve, plotting the measured mean signal versus variance for each read. A best-fit line to this plot will produce the measured gain value. The expected accuracy of the final calculated gain values is 5%, based on results from previous cycles.

Proposal 13564 - Visit 01 - IR gain monitor

Thu Oct 03 02:27:08 GMT 2013

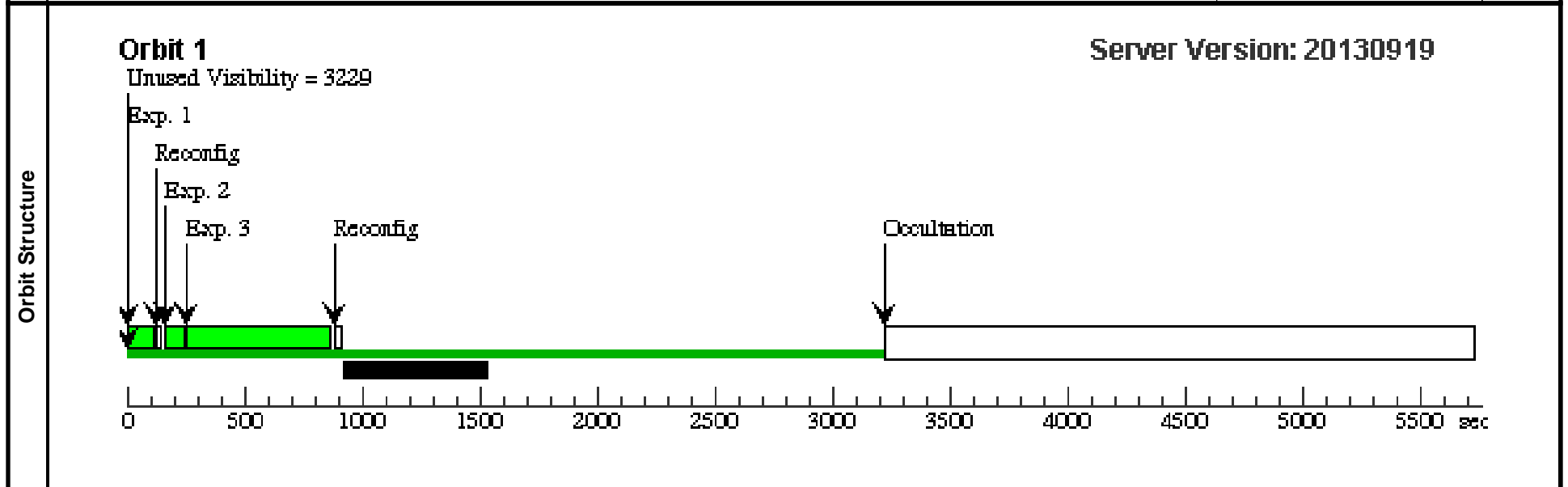
Visit	Proposal 13564, Visit 01									
	Diagnostic Status: No Diagnostics									
	Scientific Instruments: WFC3/IR									
	Special Requirements: BETWEEN 01-NOV-2013 AND 01-FEB-2014									

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	Dark	DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=SPARS 10; NSAMP=9			82.939995 Secs (82.94 Secs) [==>]	[1]
	2	Warm-up Fl at	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 10; NSAMP=6			52.937106 Secs (52.937 Secs) [==>]	[1]
	3	Gain Flat	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 50; NSAMP=13			602.937703 Secs (602.938 Secs) [==>]	[1]



Visit	Proposal 13564, Visit 02									
	Diagnostic Status: No Diagnostics									
	Scientific Instruments: WFC3/IR									
	Special Requirements: BETWEEN 01-NOV-2013 AND 01-FEB-2014									

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	Dark	DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=SPARS 10; NSAMP=9			82.939995 Secs (82.94 Secs) [==>]	[1]
	2	Warm-up Fl at	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 10; NSAMP=6			52.937106 Secs (52.937 Secs) [==>]	[1]
	3	Gain Flat	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 50; NSAMP=13			602.937703 Secs (602.938 Secs) [==>]	[1]

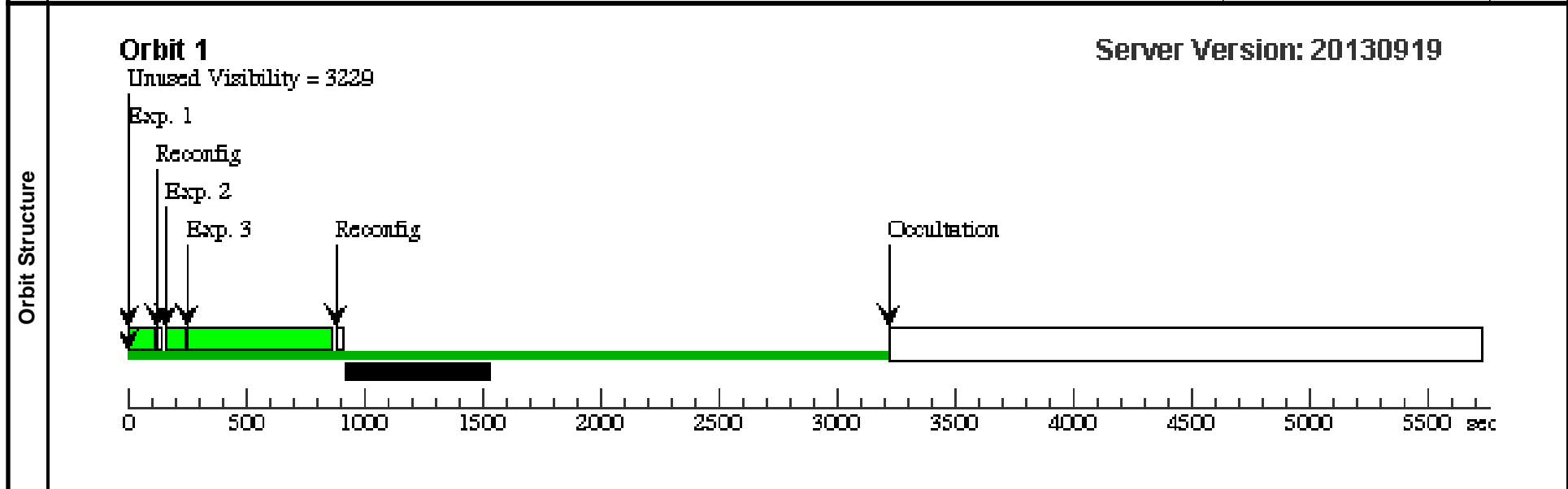


Proposal 13564 - Visit 03 - IR gain monitor

Thu Oct 03 02:27:10 GMT 2013

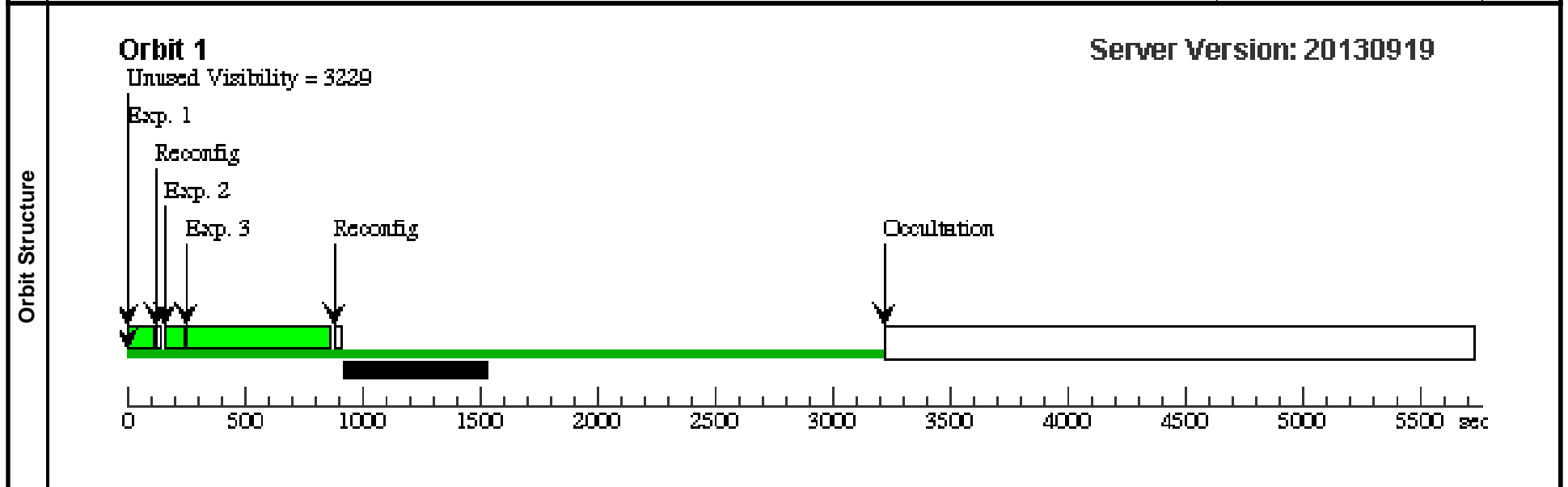
Visit	Proposal 13564, Visit 03									
	Diagnostic Status: No Diagnostics									
	Scientific Instruments: WFC3/IR									
	Special Requirements: BETWEEN 01-NOV-2013 AND 01-FEB-2014									

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	Dark	DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=SPARS 10; NSAMP=9			82.939995 Secs (82.94 Secs) [==>]	[1]
	2	Warm-up Fl at	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 10; NSAMP=6			52.937106 Secs (52.937 Secs) [==>]	[1]
	3	Gain Flat	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 50; NSAMP=13			602.937703 Secs (602.938 Secs) [==>]	[1]



Visit	Proposal 13564, Visit 04								
	Diagnostic Status: No Diagnostics								
	Scientific Instruments: WFC3/IR								
	Special Requirements: BETWEEN 01-NOV-2013 AND 01-FEB-2014								

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	Dark	DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=SPARS 10; NSAMP=9			82.939995 Secs (82.94 Secs)	
									[==>]	[1]
	2	Warm-up Fl at	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 10; NSAMP=6			52.937106 Secs (52.937 Secs)	
								[==>]	[1]	
3	Gain Flat	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 50; NSAMP=13			602.937703 Secs (602.938 Secs)		
								[==>]	[1]	

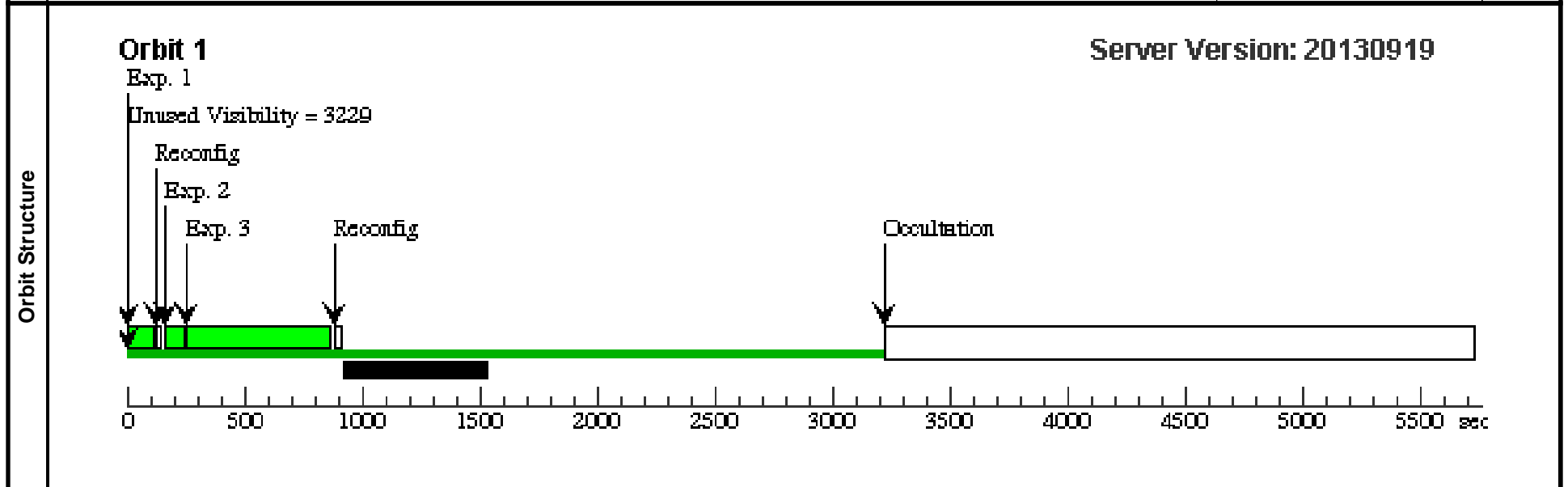


Proposal 13564 - Visit 05 - IR gain monitor

Thu Oct 03 02:27:12 GMT 2013

Visit	Proposal 13564, Visit 05									
	Diagnostic Status: No Diagnostics									
	Scientific Instruments: WFC3/IR									
	Special Requirements: BETWEEN 01-NOV-2013 AND 01-FEB-2014									

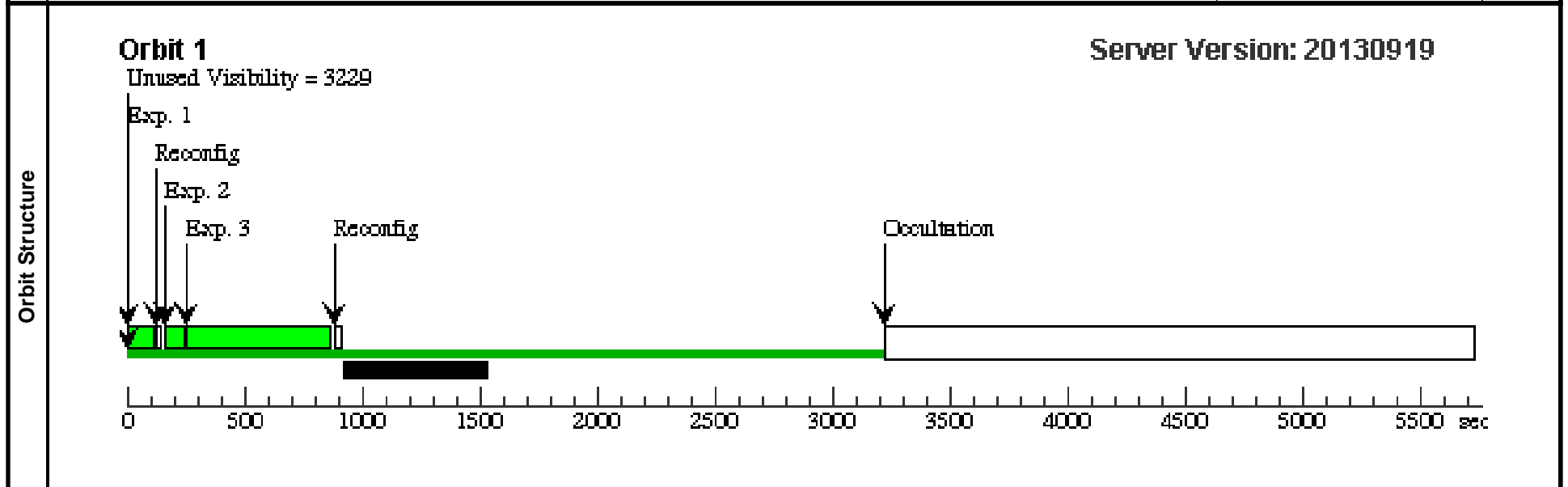
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	Dark	DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=SPARS 10; NSAMP=9			82.939995 Secs (82.94 Secs) [==>]	[1]
	2	Warm-up Flat at	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 10; NSAMP=6			52.937106 Secs (52.937 Secs) [==>]	[1]
	3	Gain Flat	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 50; NSAMP=13			602.937703 Secs (602.938 Secs) [==>]	[1]



Proposal 13564 - Visit 06 - IR gain monitor

Visit	Proposal 13564, Visit 06								Thu Oct 03 02:27:12 GMT 2013
	Diagnostic Status: No Diagnostics								
	Scientific Instruments: WFC3/IR								
	Special Requirements: BETWEEN 01-NOV-2013 AND 01-FEB-2014								

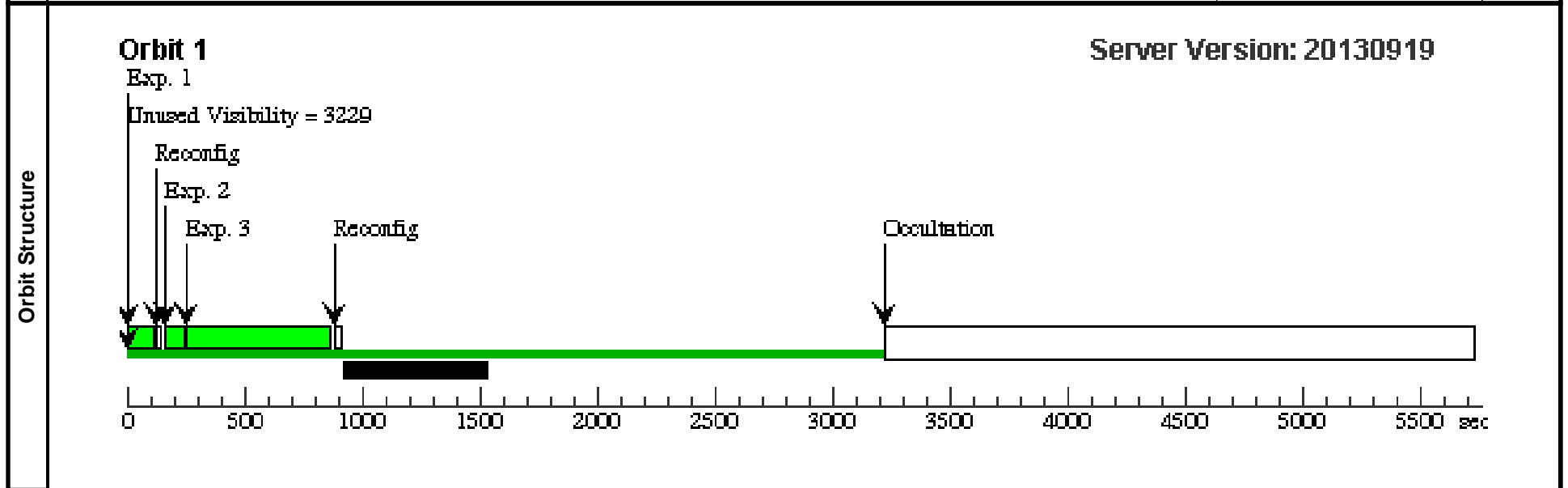
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	Dark	DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=SPARS 10; NSAMP=9			82.939995 Secs (82.94 Secs)	
									[==>]	[1]
	2	Warm-up Fl at	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 10; NSAMP=6			52.937106 Secs (52.937 Secs)	
								[==>]	[1]	
3	Gain Flat	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 50; NSAMP=13			602.937703 Secs (602.938 Secs)		
								[==>]	[1]	



Proposal 13564 - Visit 07 - IR gain monitor

Visit	Proposal 13564, Visit 07								Thu Oct 03 02:27:13 GMT 2013
	Diagnostic Status: No Diagnostics								
	Scientific Instruments: WFC3/IR								
	Special Requirements: BETWEEN 01-NOV-2013 AND 01-FEB-2014								

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	Dark	DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=SPARS 10; NSAMP=9			82.939995 Secs (82.94 Secs)	
									[==>]	[1]
	2	Warm-up Flat at	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 10; NSAMP=6			52.937106 Secs (52.937 Secs)	
								[==>]	[1]	
	3	Gain Flat	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 50; NSAMP=13			602.937703 Secs (602.938 Secs)	
								[==>]	[1]	

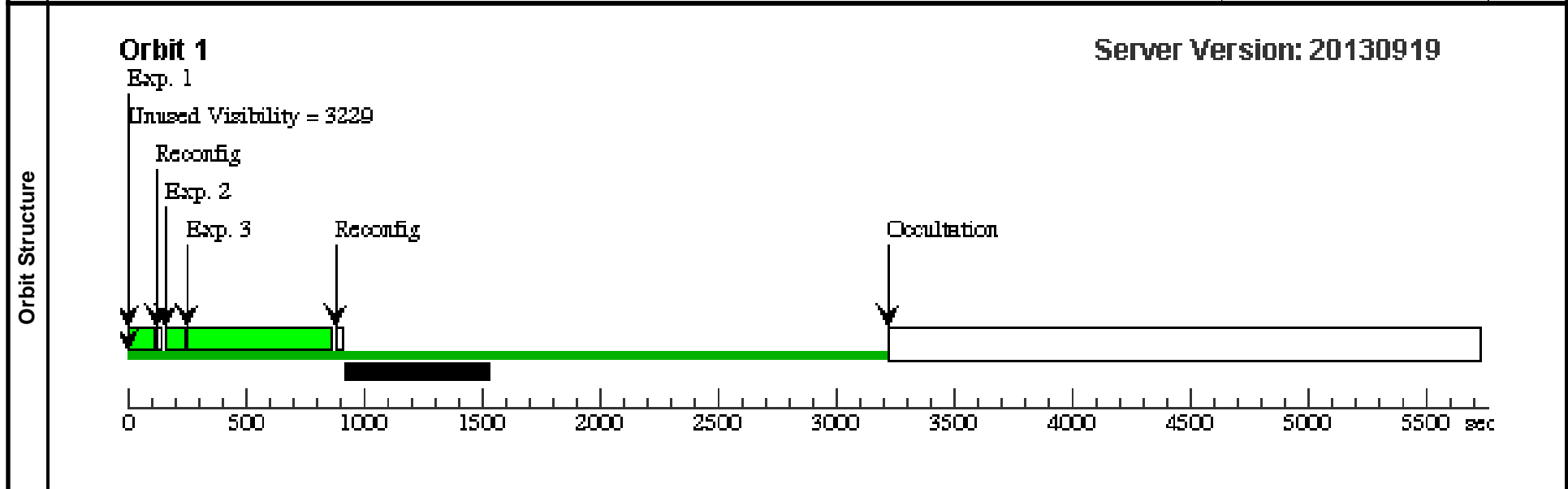


Proposal 13564 - Visit 08 - IR gain monitor

Thu Oct 03 02:27:13 GMT 2013

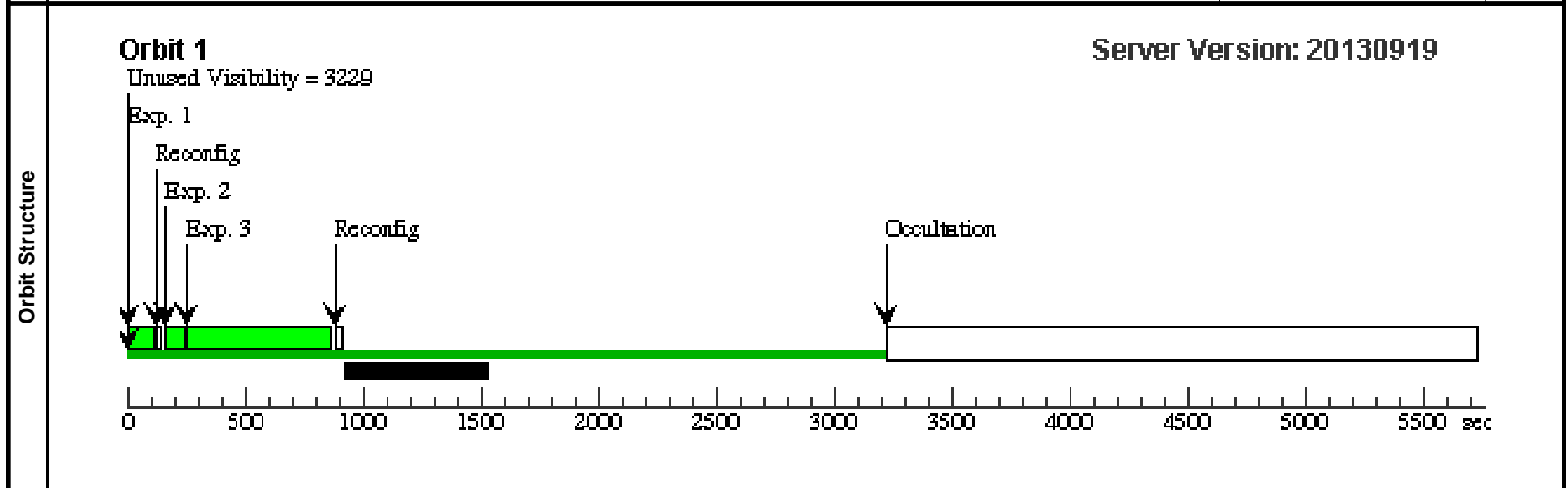
Visit	Proposal 13564, Visit 08									
	Diagnostic Status: No Diagnostics									
	Scientific Instruments: WFC3/IR									
	Special Requirements: BETWEEN 01-NOV-2013 AND 01-FEB-2014									

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	Dark	DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=SPARS 10; NSAMP=9			82.939995 Secs (82.94 Secs) [==>]	[1]
	2	Warm-up Fl at	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 10; NSAMP=6			52.937106 Secs (52.937 Secs) [==>]	[1]
	3	Gain Flat	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 50; NSAMP=13			602.937703 Secs (602.938 Secs) [==>]	[1]



Visit	Proposal 13564, Visit 09									
	Diagnostic Status: No Diagnostics									
	Scientific Instruments: WFC3/IR									
	Special Requirements: BETWEEN 01-JUN-2014 AND 01-SEP-2014									

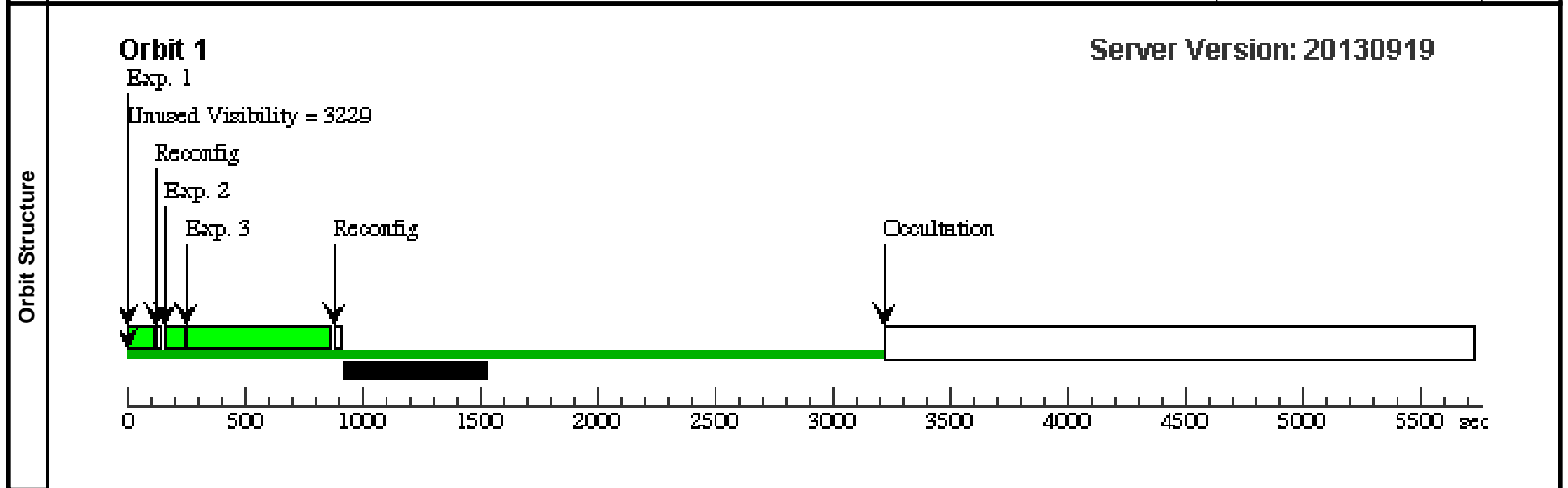
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	Dark	DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=SPARS 10; NSAMP=9			82.939995 Secs (82.94 Secs) [==>]	[1]
	2	Warm-up Fl at	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 10; NSAMP=6			52.937106 Secs (52.937 Secs) [==>]	[1]
	3	Gain Flat	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 50; NSAMP=13			602.937703 Secs (602.938 Secs) [==>]	[1]



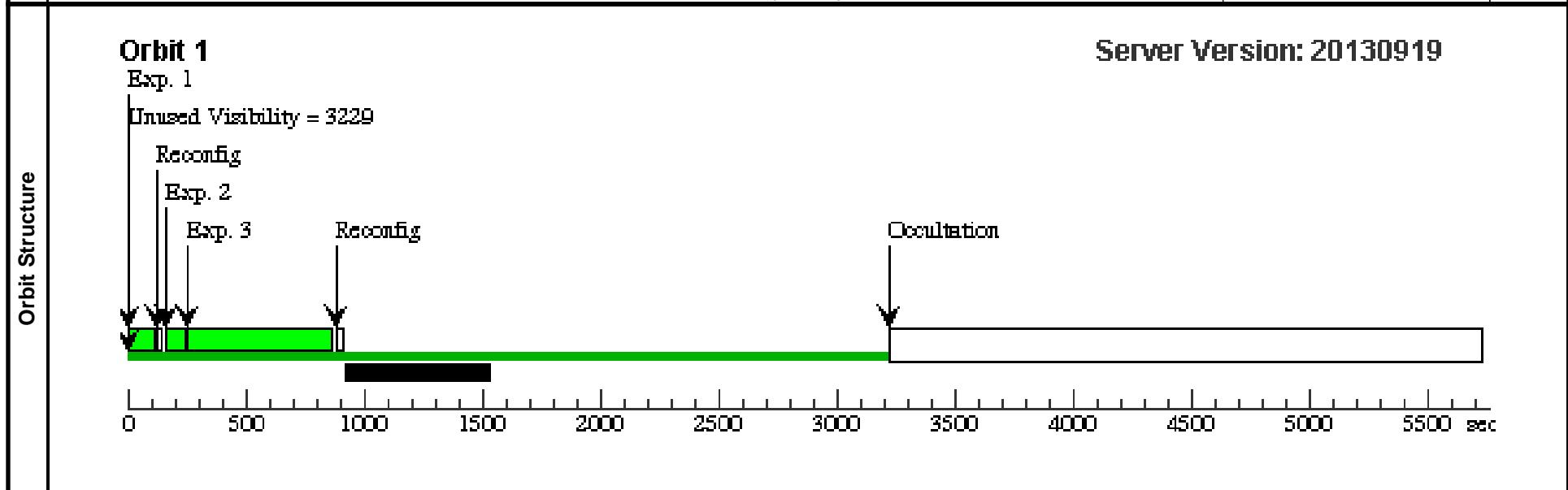
Proposal 13564 - Visit 10 - IR gain monitor

Visit	Proposal 13564, Visit 10								Thu Oct 03 02:27:15 GMT 2013
	Diagnostic Status: No Diagnostics								
	Scientific Instruments: WFC3/IR								
	Special Requirements: BETWEEN 01-JUN-2014 AND 01-SEP-2014								

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	Dark	DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=SPARS 10; NSAMP=9			82.939995 Secs (82.94 Secs) [==>]	[1]
	2	Warm-up Fl at	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 10; NSAMP=6			52.937106 Secs (52.937 Secs) [==>]	[1]
	3	Gain Flat	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 50; NSAMP=13			602.937703 Secs (602.938 Secs) [==>]	[1]



Visit	Proposal 13564, Visit 11									
	Diagnostic Status: No Diagnostics									
Scientific Instruments: WFC3/IR										
Special Requirements: BETWEEN 01-JUN-2014 AND 01-SEP-2014										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	Dark	DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=SPARS 10; NSAMP=9			82.939995 Secs (82.94 Secs)	[1]
	2	Warm-up Fl at	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 10; NSAMP=6			52.937106 Secs (52.937 Secs)	[1]
	3	Gain Flat	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 50; NSAMP=13			602.937703 Secs (602.938 Secs)	[1]

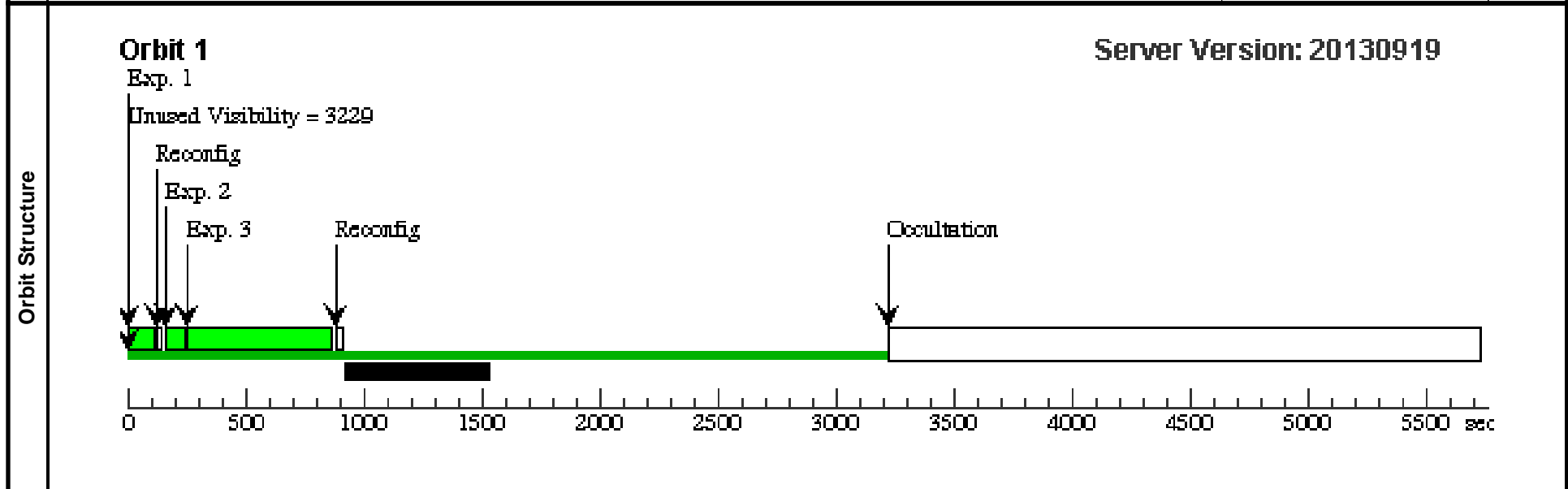


Proposal 13564 - Visit 12 - IR gain monitor

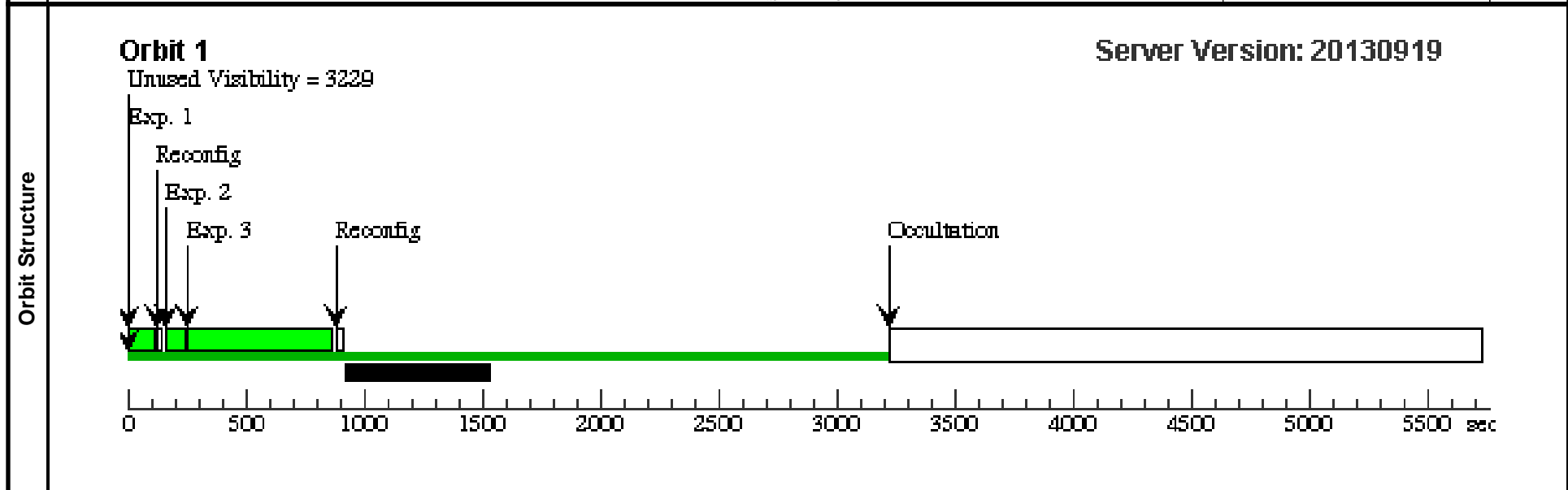
Thu Oct 03 02:27:16 GMT 2013

Visit	Proposal 13564, Visit 12									
	Diagnostic Status: No Diagnostics									
	Scientific Instruments: WFC3/IR									
	Special Requirements: BETWEEN 01-JUN-2014 AND 01-SEP-2014									

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	Dark	DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=SPARS 10; NSAMP=9			82.939995 Secs (82.94 Secs) [==>]	[1]
	2	Warm-up Flat at	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 10; NSAMP=6			52.937106 Secs (52.937 Secs) [==>]	[1]
	3	Gain Flat	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 50; NSAMP=13			602.937703 Secs (602.938 Secs) [==>]	[1]

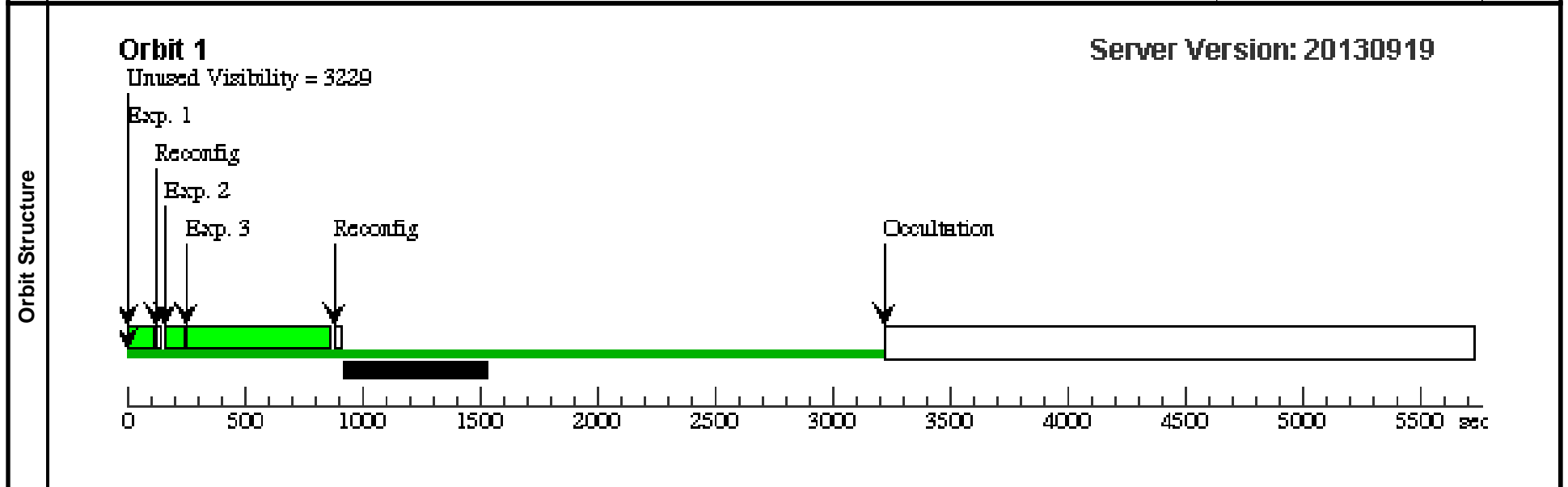


Visit	Proposal 13564, Visit 13									
	Diagnostic Status: No Diagnostics									
Scientific Instruments: WFC3/IR										
Special Requirements: BETWEEN 01-JUN-2014 AND 01-SEP-2014										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	Dark	DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=SPARS 10; NSAMP=9			82.939995 Secs (82.94 Secs)	[1]
	2	Warm-up Fl at	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 10; NSAMP=6			52.937106 Secs (52.937 Secs)	[1]
	3	Gain Flat	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 50; NSAMP=13			602.937703 Secs (602.938 Secs)	[1]

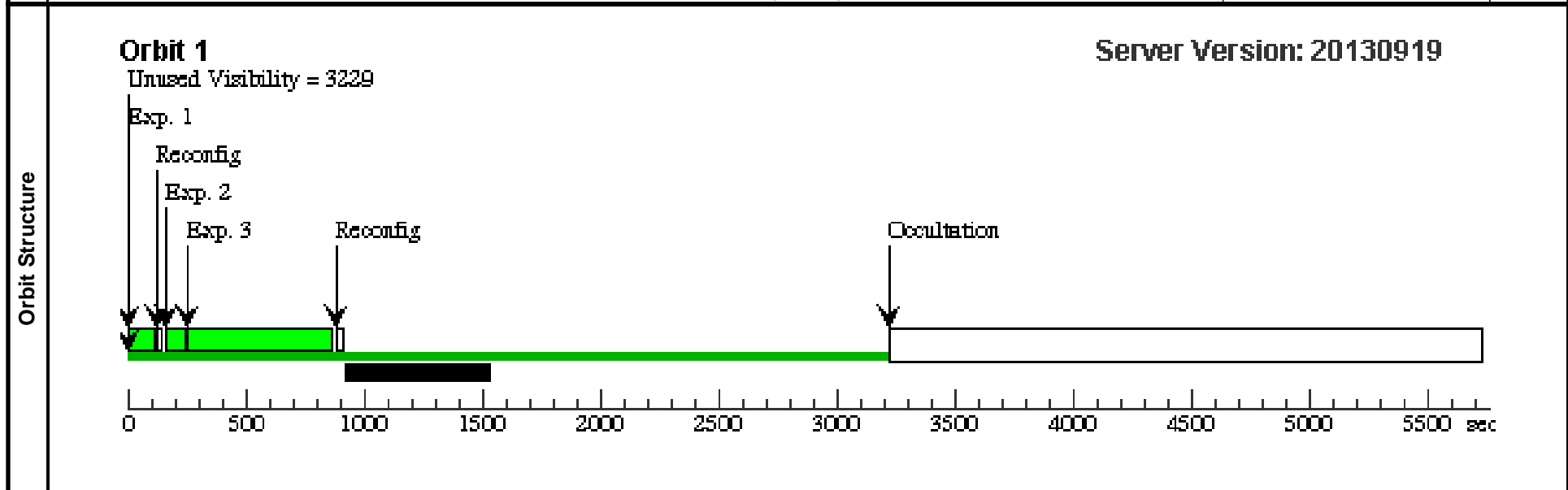


Visit	Proposal 13564, Visit 14									
	Diagnostic Status: No Diagnostics									
	Scientific Instruments: WFC3/IR									
	Special Requirements: BETWEEN 01-JUN-2014 AND 01-SEP-2014									

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	Dark	DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=SPARS 10; NSAMP=9			82.939995 Secs (82.94 Secs)	[1]
	2	Warm-up Fl at	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 10; NSAMP=6			52.937106 Secs (52.937 Secs)	[1]
	3	Gain Flat	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 50; NSAMP=13			602.937703 Secs (602.938 Secs)	[1]



Visit	Proposal 13564, Visit 15									
	Diagnostic Status: No Diagnostics									
Scientific Instruments: WFC3/IR										
Special Requirements: BETWEEN 01-JUN-2014 AND 01-SEP-2014										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	Dark	DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=SPARS 10; NSAMP=9			82.939995 Secs (82.94 Secs)	[1]
	2	Warm-up Fl at	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 10; NSAMP=6			52.937106 Secs (52.937 Secs)	[1]
	3	Gain Flat	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 50; NSAMP=13			602.937703 Secs (602.938 Secs)	[1]



Visit	Proposal 13564, Visit 16									
	Diagnostic Status: No Diagnostics									
	Scientific Instruments: WFC3/IR									
	Special Requirements: BETWEEN 01-JUN-2014 AND 01-SEP-2014									

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	Dark	DARK	WFC3/IR, MULTIACCUM, IR	BLANK	SAMP-SEQ=SPARS 10; NSAMP=9			82.939995 Secs (82.94 Secs) [==>]	[1]
	2	Warm-up Fl at	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 10; NSAMP=6			52.937106 Secs (52.937 Secs) [==>]	[1]
	3	Gain Flat	TUNGSTEN	WFC3/IR, MULTIACCUM, IR	F126N	SAMP-SEQ=SPARS 50; NSAMP=13			602.937703 Secs (602.938 Secs) [==>]	[1]

