



15581 - WFC3 Short-term IR Persistence

Cycle: 26, Proposal Category: CAL/WFC3

(Availability Mode: RESTRICTED)

INVESTIGATORS

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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	(1) URANUS DARK	WFC3/IR	2	27-Mar-2019 12:01:55.0	yes
03	(1) URANUS DARK	WFC3/IR	2	27-Mar-2019 12:02:24.0	yes

4 Total Orbits Used

ABSTRACT

Persistence in the WFC3/IR channel decays as a power law with time for $t > 300$ s. Using data from Program 14016 (target: the star cluster Westerlund 1), we have observed a tapering off of the power law at short times. The analysis of those data is however limited to the darks. The externals proved to suffer of too much crowding, thus making it hard to measure the local background and the persistence signal on top of it. In order to truly exploit the externals and

reach the shortest allowed times, we propose to observe a more compact target: Uranus. This will allow us to have a larger free portion of the IR detector, to obtain better sky measurements.

OBSERVING DESCRIPTION

The first orbit pair consists of 8 external full-frame exposures of Uranus in F127M, using SAMP-SEQ = SPARS25 with NSAMP=12.

The exposure time is chosen to avoid buffer dump overheads.

Based on existing WFC3/IR observations of Uranus in the F125W filter, during the ~280s exposures we expect Uranus to reach about 5 times saturation. Each exposure acts as a stimulus for the following, and a persistence image for the previous ones. The dithers cause a ~42 seconds delay between the end of exposure i and the beginning of exposure $i+1$. This is a fundamental limitation in the shortest time at which persistence can be measured.

This setup has been used successfully in the past, modulo the aforementioned limitation.

The second orbit tries to overcome the short-time limitation by using back-to-back exposures of Uranus (without dithers), but taking first a F125W exposure, and then putting the BLANK in, to take a "simil-dark" exposure where only persistence from the previous Uranus image should be present. After each pair, a dither is performed, to place Uranus in a yet-unexposed part of the detector.

In this case we use the IRSUB512 aperture, to maximize the number of back-to-back pairs.

Increased counts via broader filter (4 times larger Bandwidth with respect to F127M) offset the reduction in counts due to shorter exptime (110 vs 280), thus we can still achieve the required saturation to measure persistence.

In the second visit we also use a faster sampling sequence: SPARS10 vs SPARS25, which should allow a better sampling at the very short times after the stimulus.

With NSAMP=15, the buffer dump can be hidden during each reach and is done without incurring in overheads

Also this external orbit is followed by darks to sample the long-term fading of persistence.

The VISIBILITY OVERRUN warnign at the end of Orbit1 of visit2 is not a problem, because it happens during the final BLANK expsoure.

Proposal 15581 - Visit 01 - WFC3 Short-term IR Persistence

Visit	Proposal 15581, Visit 01, completed Wed Mar 27 16:02:27 GMT 2019 Diagnostic Status: Warning Scientific Instruments: WFC3/IR Special Requirements: (none)																			
	(Visit 01) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN																			
Diagnostics																				
Solar System Targets	<table border="1"> <thead> <tr> <th>#</th> <th>Name</th> <th>Level 1</th> <th>Level 2</th> <th>Level 3</th> <th>Window</th> <th>Ephem Center</th> </tr> </thead> <tbody> <tr> <td>(1)</td> <td>URANUS</td> <td>STD=URANUS</td> <td></td> <td></td> <td></td> <td>EARTH</td> </tr> </tbody> </table>	#	Name	Level 1	Level 2	Level 3	Window	Ephem Center	(1)	URANUS	STD=URANUS				EARTH					
	#	Name	Level 1	Level 2	Level 3	Window	Ephem Center													
(1)	URANUS	STD=URANUS				EARTH														
Comments: The quoted V-magnitude is the average, the quoted error is half the difference between maximum and minimum brightness Description=Planet Uranus Extended=YES																				

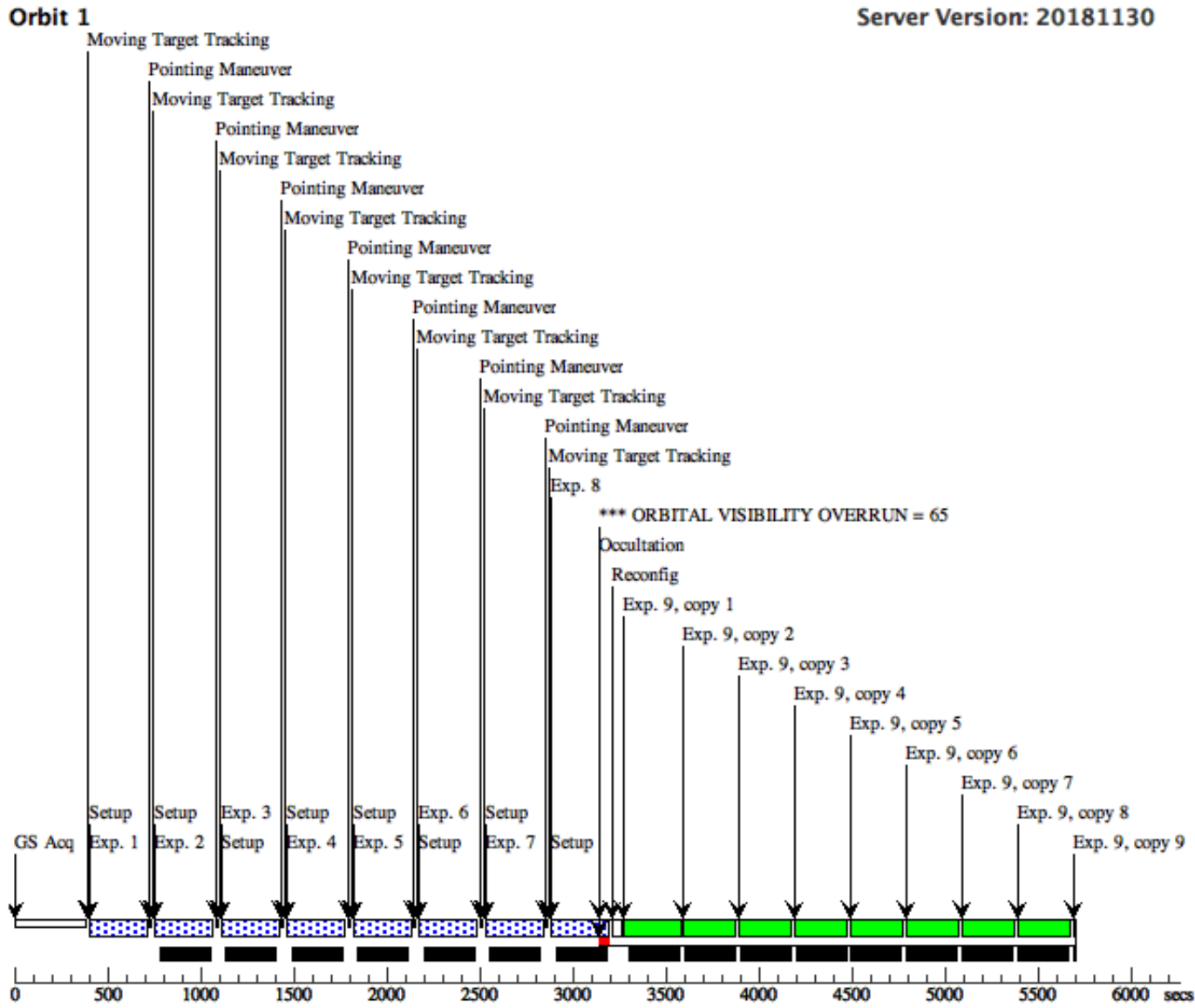
Proposal 15581 - Visit 01 - WFC3 Short-term IR Persistence

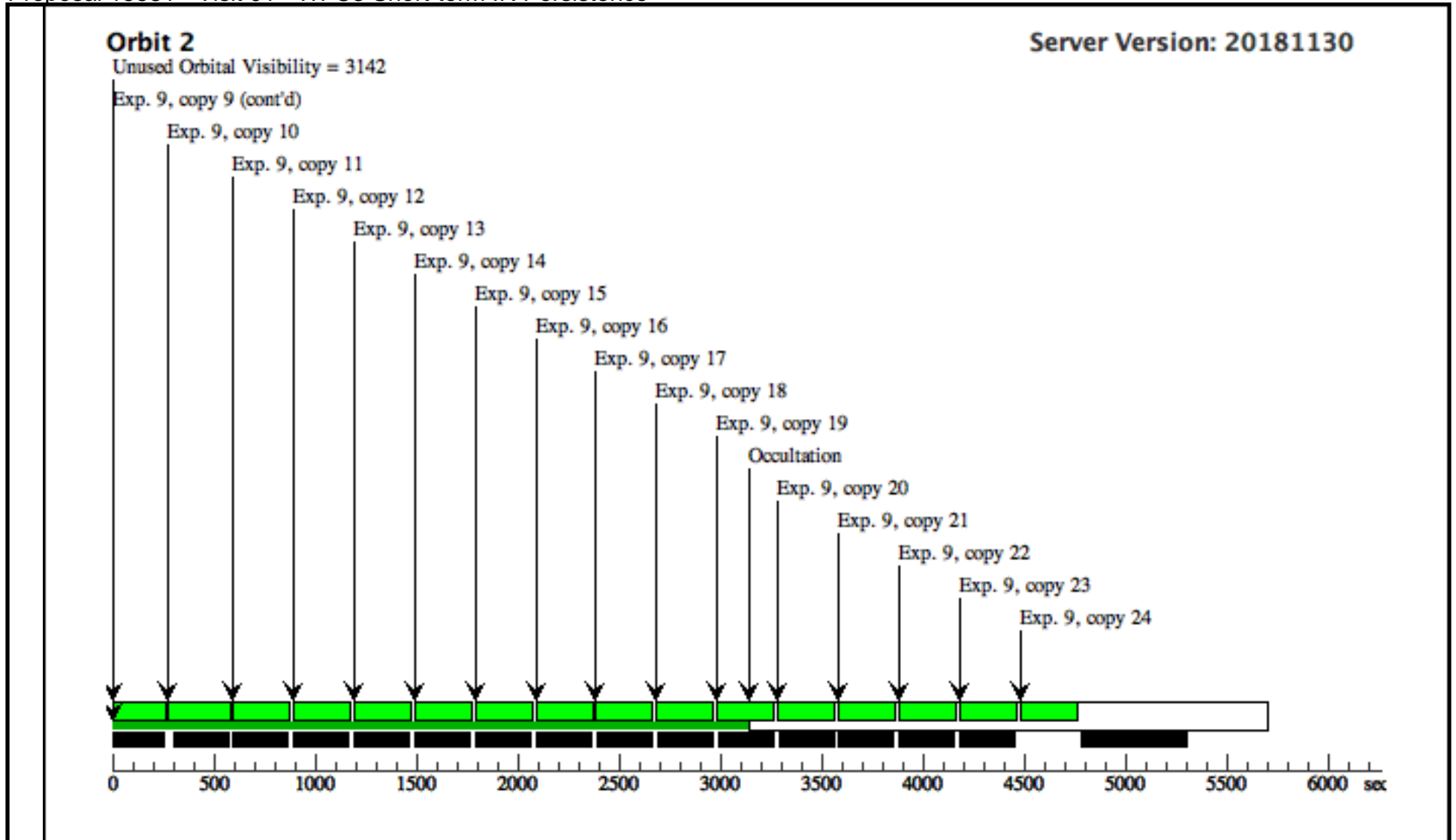
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
Exposures	1	(1) URANUS	WFC3/IR, MULTIACCUM, IR	F127M	SAMP-SEQ=SPARS 25; NSAMP=12	POS TARG -15,45	Sequence 1-9 Non-Int in Visit 01	277.937956 Secs (277.938 Secs) [==>]	[1]
	2	(1) URANUS	WFC3/IR, MULTIACCUM, IR	F127M	SAMP-SEQ=SPARS 25; NSAMP=12	POS TARG -45,15	Sequence 1-9 Non-Int in Visit 01	277.937956 Secs (277.938 Secs) [==>]	[1]
	3	(1) URANUS	WFC3/IR, MULTIACCUM, IR	F127M	SAMP-SEQ=SPARS 25; NSAMP=12	POS TARG -45,-45	Sequence 1-9 Non-Int in Visit 01	277.937956 Secs (277.938 Secs) [==>]	[1]
	4	(1) URANUS	WFC3/IR, MULTIACCUM, IR	F127M	SAMP-SEQ=SPARS 25; NSAMP=12	POS TARG -15,-15	Sequence 1-9 Non-Int in Visit 01	277.937956 Secs (277.938 Secs) [==>]	[1]
	5	(1) URANUS	WFC3/IR, MULTIACCUM, IR	F127M	SAMP-SEQ=SPARS 25; NSAMP=12	POS TARG 15,-45	Sequence 1-9 Non-Int in Visit 01	277.937956 Secs (277.938 Secs) [==>]	[1]
	6	(1) URANUS	WFC3/IR, MULTIACCUM, IR	F127M	SAMP-SEQ=SPARS 25; NSAMP=12	POS TARG 15,15	Sequence 1-9 Non-Int in Visit 01	277.937956 Secs (277.938 Secs) [==>]	[1]
	7	(1) URANUS	WFC3/IR, MULTIACCUM, IR	F127M	SAMP-SEQ=SPARS 25; NSAMP=12	POS TARG 45,45	Sequence 1-9 Non-Int in Visit 01	277.937956 Secs (277.938 Secs) [==>]	[1]
	8	(1) URANUS	WFC3/IR, MULTIACCUM, IR	F127M	SAMP-SEQ=SPARS 25; NSAMP=12	POS TARG 45,-15	Sequence 1-9 Non-Int in Visit 01	277.937956 Secs (277.938 Secs) [==>]	[1]

Proposal 15581 - Visit 01 - WFC3 Short-term IR Persistence

9	DARK	WFC3/IR, MULTIACCUM, IR-FIX BLANK	SAMP-SEQ=SPARS 25; NSAMP=12	Sequence 1-9 Non-Int in Visit 01	277.937956 Secs X 24 (6670.511 Secs)	
					[==>(Copy 1)] [==>(Copy 2)] [==>(Copy 3)] [==>(Copy 4)] [==>(Copy 5)] [==>(Copy 6)] [==>(Copy 7)] [==>(Copy 8)] [==>(Copy 9)]	[1]
					[==>(Copy 10)] [==>(Copy 11)] [==>(Copy 12)] [==>(Copy 13)] [==>(Copy 14)] [==>(Copy 15)] [==>(Copy 16)] [==>(Copy 17)] [==>(Copy 18)] [==>(Copy 19)] [==>(Copy 20)] [==>(Copy 21)] [==>(Copy 22)] [==>(Copy 23)] [==>(Copy 24)]	[2]

Orbit Structure





Proposal 15581 - Visit02_new_pattern (03) - WFC3 Short-term IR Persistence

Wed Mar 27 16:02:27 GMT 2019

Visit	<p>Proposal 15581, Visit02_new_pattern (03)</p> <p>Diagnostic Status: No Diagnostics</p> <p>Scientific Instruments: WFC3/IR</p> <p>Special Requirements: (none)</p> <p><i>Comments: This version of this visits accountns for the larger acquisition overheads by dropping one of the external exposures, and thus avoiding visibility overruns. A new dither pattern is also introduced to avoid contaminating the persistence images with either one of a) diffraction spikes from Uranus, b) glow of the Uranus disk itself, c) cross-talk images, d) blobs in the IR channel</i></p>																				
	Solar System Targets	<table border="1"> <thead> <tr> <th>#</th> <th>Name</th> <th>Level 1</th> <th>Level 2</th> <th>Level 3</th> <th>Window</th> <th>Ephem Center</th> </tr> </thead> <tbody> <tr> <td>(1)</td> <td>URANUS</td> <td>STD=URANUS</td> <td></td> <td></td> <td></td> <td>EARTH</td> </tr> </tbody> </table>	#	Name	Level 1	Level 2	Level 3	Window	Ephem Center	(1)	URANUS	STD=URANUS				EARTH	<p><i>Comments: The quoted V-magnitiude is the average, the quoted error is half the difference bewteen maximum and minimum brightness</i></p> <p><i>Description=Planet Uranus</i></p> <p><i>Extended=YES</i></p>				
#		Name	Level 1	Level 2	Level 3	Window	Ephem Center														
(1)	URANUS	STD=URANUS				EARTH															

Proposal 15581 - Visit02_new_pattern (03) - WFC3 Short-term IR Persistence

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
Exposures	1	(1) URANUS	WFC3/IR, MULTIACCUM, IRSUB512-FIX	F125W	SAMP-SEQ=SPARS 10; NSAMP=15	POS TARG 0,-19.75 ; GS ACQ SCENARIO BASE1BE	Sequence 1-18 Non-Int in Visit02_new_pattern (03)	111.756813 Secs (111.757 Secs) [==>]	[1]
	2	(1) URANUS	WFC3/IR, MULTIACCUM, IRSUB512-FIX	BLANK	SAMP-SEQ=SPARS 10; NSAMP=15	SAME POS AS 1	Sequence 1-18 Non-Int in Visit02_new_pattern (03)	111.756813 Secs (111.757 Secs) [==>]	[1]
	3	(1) URANUS	WFC3/IR, MULTIACCUM, IRSUB512-FIX	F125W	SAMP-SEQ=SPARS 10; NSAMP=15	POS TARG -14.5,3.5	Sequence 1-18 Non-Int in Visit02_new_pattern (03)	111.756813 Secs (111.757 Secs) [==>]	[1]
	4	(1) URANUS	WFC3/IR, MULTIACCUM, IRSUB512-FIX	BLANK	SAMP-SEQ=SPARS 10; NSAMP=15	SAME POS AS 3	Sequence 1-18 Non-Int in Visit02_new_pattern (03)	111.756813 Secs (111.757 Secs) [==>]	[1]
	5	(1) URANUS	WFC3/IR, MULTIACCUM, IRSUB512-FIX	F125W	SAMP-SEQ=SPARS 10; NSAMP=15	POS TARG 14.5,3.5	Sequence 1-18 Non-Int in Visit02_new_pattern (03)	111.756813 Secs (111.757 Secs) [==>]	[1]
	6	(1) URANUS	WFC3/IR, MULTIACCUM, IRSUB512-FIX	BLANK	SAMP-SEQ=SPARS 10; NSAMP=15	SAME POS AS 5	Sequence 1-18 Non-Int in Visit02_new_pattern (03)	111.756813 Secs (111.757 Secs) [==>]	[1]
	7	(1) URANUS	WFC3/IR, MULTIACCUM, IRSUB512-FIX	F125W	SAMP-SEQ=SPARS 10; NSAMP=15	POS TARG 0,25.5	Sequence 1-18 Non-Int in Visit02_new_pattern (03)	111.756813 Secs (111.757 Secs) [==>]	[1]
	8	(1) URANUS	WFC3/IR, MULTIACCUM, IRSUB512-FIX	BLANK	SAMP-SEQ=SPARS 10; NSAMP=15	SAME POS AS 7	Sequence 1-18 Non-Int in Visit02_new_pattern (03)	111.756813 Secs (111.757 Secs) [==>]	[1]
	9	(1) URANUS	WFC3/IR, MULTIACCUM, IRSUB512-FIX	F125W	SAMP-SEQ=SPARS 10; NSAMP=15	POS TARG 28.25,23.25	Sequence 1-18 Non-Int in Visit02_new_pattern (03)	111.756813 Secs (111.757 Secs) [==>]	[1]
	10	(1) URANUS	WFC3/IR, MULTIACCUM, IRSUB512-FIX	BLANK	SAMP-SEQ=SPARS 10; NSAMP=15	SAME POS AS 9	Sequence 1-18 Non-Int in Visit02_new_pattern (03)	111.756813 Secs (111.757 Secs) [==>]	[1]
	11	(1) URANUS	WFC3/IR, MULTIACCUM, IRSUB512-FIX	F125W	SAMP-SEQ=SPARS 10; NSAMP=15	POS TARG -28.25,23.25	Sequence 1-18 Non-Int in Visit02_new_pattern (03)	111.756813 Secs (111.757 Secs) [==>]	[1]
	12	(1) URANUS	WFC3/IR, MULTIACCUM, IRSUB512-FIX	BLANK	SAMP-SEQ=SPARS 10; NSAMP=15	SAME POS AS 11	Sequence 1-18 Non-Int in Visit02_new_pattern (03)	111.756813 Secs (111.757 Secs) [==>]	[1]
	13	(1) URANUS	WFC3/IR, MULTIACCUM, IRSUB512-FIX	F125W	SAMP-SEQ=SPARS 10; NSAMP=15	POS TARG -28.25,-16.25	Sequence 1-18 Non-Int in Visit02_new_pattern (03)	111.756813 Secs (111.757 Secs) [==>]	[1]
	14	(1) URANUS	WFC3/IR, MULTIACCUM, IRSUB512-FIX	BLANK	SAMP-SEQ=SPARS 10; NSAMP=15	SAME POS AS 13	Sequence 1-18 Non-Int in Visit02_new_pattern (03)	111.756813 Secs (111.757 Secs) [==>]	[1]
	15	(1) URANUS	WFC3/IR, MULTIACCUM, IRSUB512-FIX	F125W	SAMP-SEQ=SPARS 10; NSAMP=15	POS TARG 28.25,-16.25	Sequence 1-18 Non-Int in Visit02_new_pattern (03)	111.756813 Secs (111.757 Secs) [==>]	[1]
	16	(1) URANUS	WFC3/IR, MULTIACCUM, IRSUB512-FIX	BLANK	SAMP-SEQ=SPARS 10; NSAMP=15	SAME POS AS 15	Sequence 1-18 Non-Int in Visit02_new_pattern (03)	111.756813 Secs (111.757 Secs) [==>]	[1]

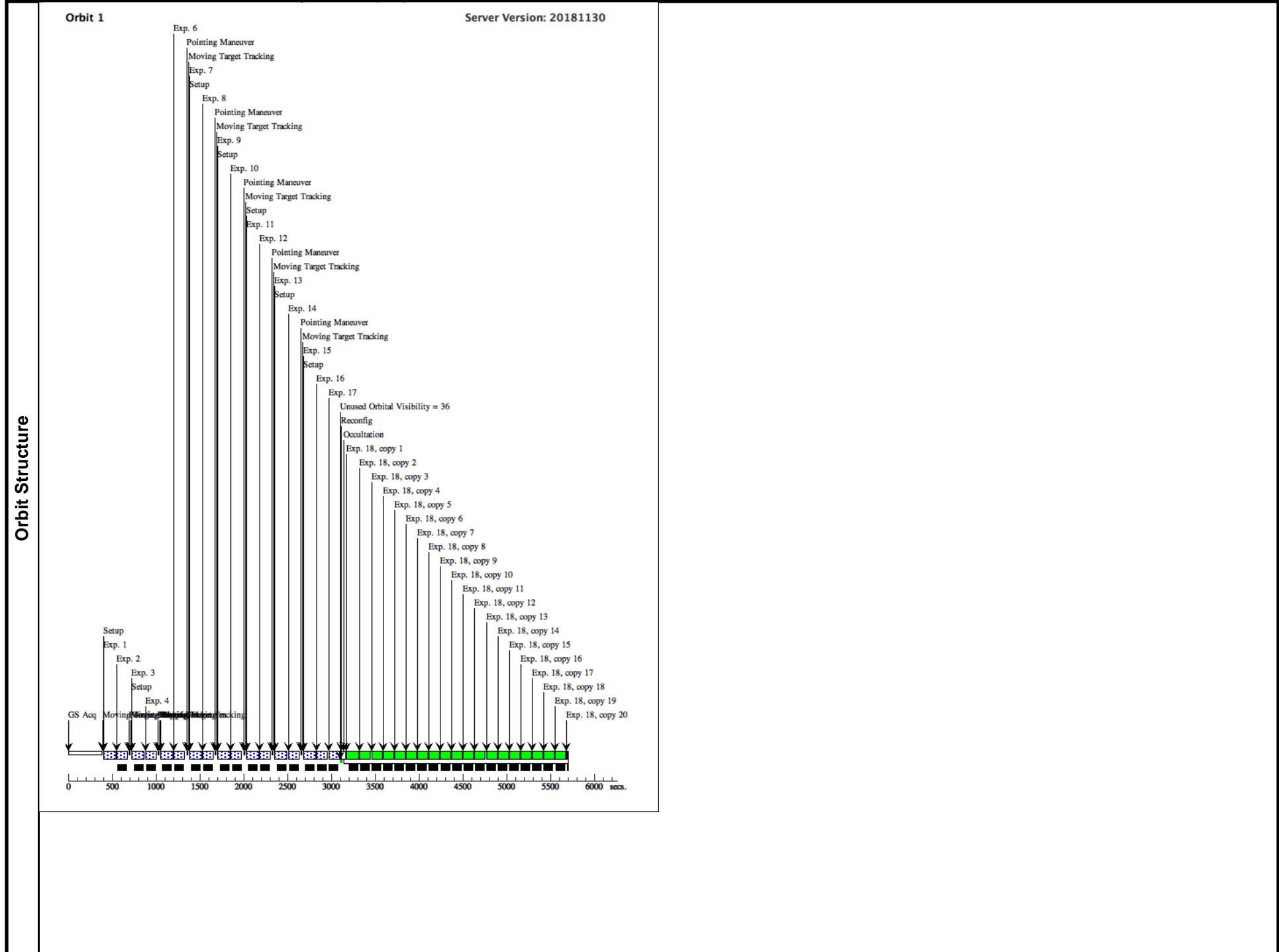
Proposal 15581 - Visit02 new pattern (03) - WFC3 Short-term IR Persistence

17	(1) URANUS	WFC3/IR, MULTIACCUM, IRSUB512-FIX	BLANK	SAMP-SEQ=SPARS SAME POS AS 15 10; NSAMP=15	Sequence 1-18 Non-Int in Visit02_new_pattern (03)	111.756813 Secs (111.757 Secs) [==>]	[1]
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Proposal 15581 - Visit02_new_pattern (03) - WFC3 Short-term IR Persistence

18	DARK	WFC3/IR, MULTIACCUM, IRSUB512-FIX	BLANK	SAMP-SEQ=SPARS 10; NSAMP=15	Sequence 1-18 Non-Int in Visit02_new_pattern (03)	111.756813 Secs X 56 (6258.382 Secs) [=>(Copy 1)] [=>(Copy 2)] [=>(Copy 3)] [=>(Copy 4)] [=>(Copy 5)] [=>(Copy 6)] [=>(Copy 7)] [=>(Copy 8)] [=>(Copy 9)] [=>(Copy 10)] [=>(Copy 11)] [=>(Copy 12)] [=>(Copy 13)] [=>(Copy 14)] [=>(Copy 15)] [=>(Copy 16)] [=>(Copy 17)] [=>(Copy 18)] [=>(Copy 19)] [=>(Copy 20)]	[1]
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Proposal 15581 - Visit02 new pattern (03) - WFC3 Short-term IR Persistence

