



12905 - Unveiling the structure of the farthest galaxy protocluster: WFC3 imaging of a $z \sim 8$ galaxy overdensity

Cycle: 20, Proposal Category: GO

(Availability Mode: SUPPORTED)

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) BORG58-PROTOCLUSTER	WFC3/IR WFC3/UVIS	5	13-Jul-2012 21:06:47.0	yes
02	(1) BORG58-PROTOCLUSTER	WFC3/IR WFC3/UVIS	5	13-Jul-2012 21:07:16.0	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>
03	(1) BORG58-PROTOCLUSTER	WFC3/IR WFC3/UVIS	5	13-Jul-2012 21:07:42.0	yes
04	(1) BORG58-PROTOCLUSTER	WFC3/IR WFC3/UVIS	3	13-Jul-2012 21:08:03.0	yes

18 Total Orbits Used

ABSTRACT

Our pure-parallel WFC3/BoRG survey identified the highest redshift ($z \sim 8$) protocluster candidate, presenting the unique opportunity for follow-up observations that will unveil the nature and properties of star formation at the earliest stages of galaxy cluster assembly. We found a rare overdensity of 5 Y-dropout galaxies, with $m_{AB}=26-27$, all brighter than $m_*(z=8)$ and strongly clustered in a region of about 1 arcmin diameter (~ 2 Mpc/h comoving). The existing data establish at 99.9% confidence that the overdensity is physical and not a line-of-sight effect, but only show a glimpse of the protocluster structure and properties. Not only is the protocluster center near the edge of the imaged field but theoretical modeling predicts the presence of dozens of fainter galaxies. We propose follow-up multi-band WFC3 observations centered on the protocluster and reaching $m_{AB}=27.5$ to image the only known galaxy overdensity at $z > 7$, missing in legacy surveys such as CANDELS because of cosmic variance. From the new dataset we will detect 5-10 new protocluster members, tighten redshift uncertainty to ± 0.1 , and double the S/N of current detections to characterize their stellar population properties. The new data, combined with, and compared to detailed numerical and theoretical modeling will characterize the earliest stages of galaxy and cluster formation, shedding light on the processes that drove cosmic reionization in overdense environments. Because of a one order of magnitude boost in the number density of galaxies with $m_{AB} < m_*$ in the protocluster region, the proposed observations will create the best legacy pointing for follow-up spectroscopy at $z \sim 8$ with multi-object instruments.

OBSERVING DESCRIPTION

The observations consist of 3 5-orbit visits, each with 1 orbit in F606W, F098M, F105W, F125W, and F160W, in that order to help with persistence. Visit 4 is 1 orbit of F606W and 2 orbits of F098M. Each orbit is comprised of 4 exposures. For the IR exposures, 4 15-NSAMP SPARS50 exposures don't fill the complete orbit, so a combination of SPARS50 and SPARS100 was used to optimally use all of the available visibility.

The UVIS dither is a 4-point line dither to cover the chip gap. The IR dither is a 4-point minimum box with optimal half-pixel sampling in both x and y. It is the same as the WFC3-IR-DITHER-BOX-MIN pattern, but implemented as POSTARGS, which is necessary since the 4 exposures don't

all have the same NSAMP/SAMP-SEQ.

Timing requirements are requested to coordinate ground-based follow-up observations of targets selected by these HST observations using the MOSFIRE spectrograph on Keck.

Proposal 12905 - Visit 01 - Unveiling the structure of the farthest galaxy protocluster: WFC3 imaging of a z~8 galaxy overdensity

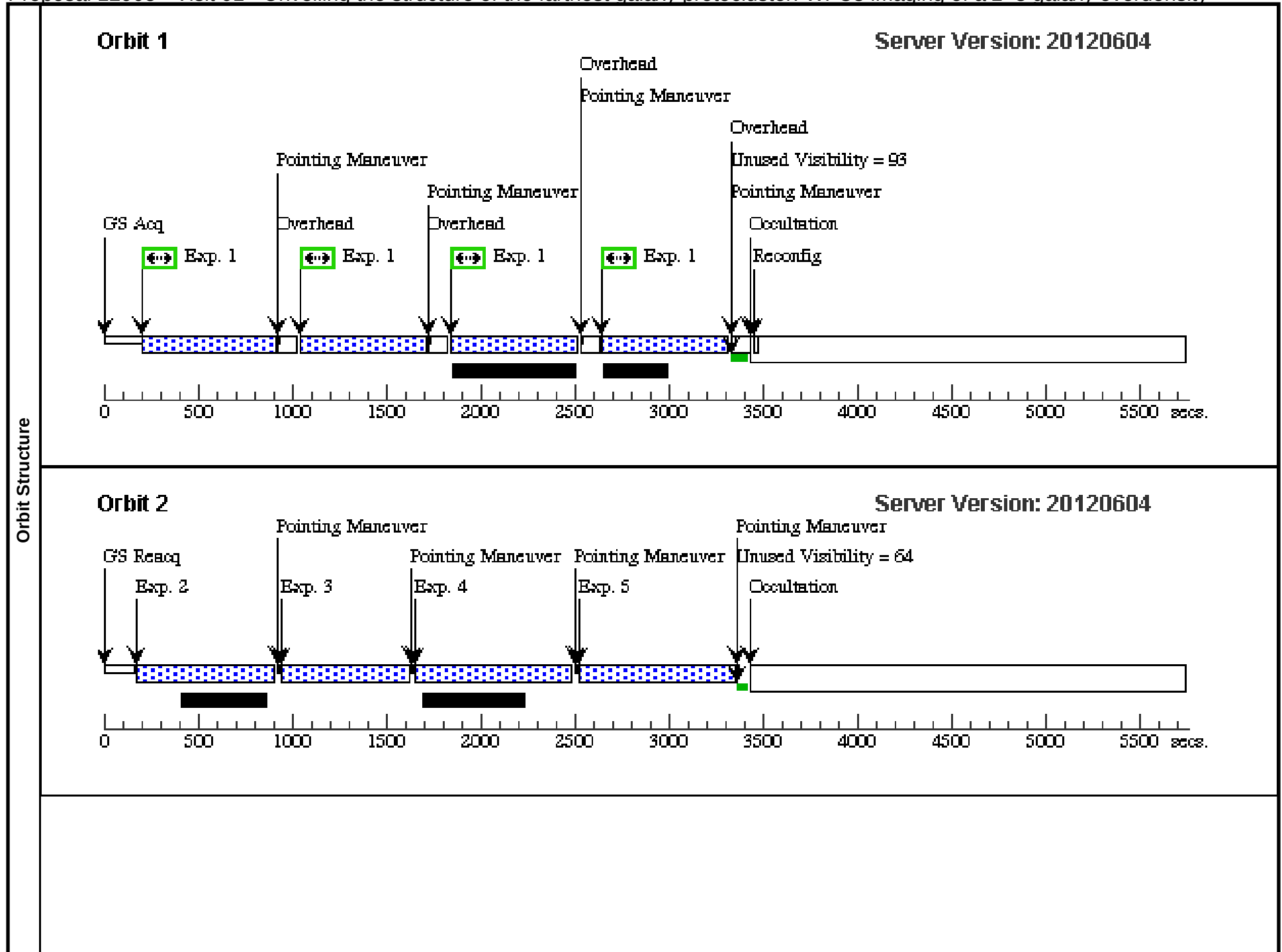
Visit	Proposal 12905, Visit 01, implementation					Sat Jul 14 01:08:13 GMT 2012
	Diagnostic Status: No Diagnostics					
	Scientific Instruments: WFC3/IR, WFC3/UVIS					
	Special Requirements: ORIENT 330D TO 345 D; BEFORE 01-MAR-2013:00:00:00					
Patterns	#	Primary Pattern			Secondary Pattern	Exposures
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Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	BORG58- PROTOCLUSTER	RA: 14 36 50.5680 (219.2107000d) Dec: +50 43 33.60 (50.72600d) Equinox: J2000		V=28+/-1	Reference Frame: ICRS

Proposal 12905 - Visit 01 - Unveiling the structure of the farthest galaxy protocluster: WFC3 imaging of a z~8 galaxy overdensity

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(1) BORG58-PROT OCLUSTER	WFC3/UVIS, ACCUM, UVIS-FIX	F606W		GS ACQ SCENARI O SINGLE	Pattern 1, Exps 1-1 i n Visit 01 (1)	676 Secs [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]
	2		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F098M	NSAMP=15; SAMP-SEQ=SPAR S50			[==>]	[2]
	3		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F098M	NSAMP=14; SAMP-SEQ=SPAR S50	POS TARG 0.542,0. 182		[==>]	[2]
	4		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F098M	NSAMP=9; SAMP-SEQ=SPAR S100	POS TARG 0.339,0. 485		[==>]	[2]
	5		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F098M	NSAMP=9; SAMP-SEQ=SPAR S100	POS TARG -0.203,0 .303		[==>]	[2]
	6		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=15; SAMP-SEQ=SPAR S50			[==>]	[3]
	7		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=14; SAMP-SEQ=SPAR S50	POS TARG 0.542,0. 182		[==>]	[3]
	8		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=9; SAMP-SEQ=SPAR S100	POS TARG 0.339,0. 485		[==>]	[3]
	9		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=9; SAMP-SEQ=SPAR S100	POS TARG -0.203,0 .303		[==>]	[3]
	10		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F125W	NSAMP=15; SAMP-SEQ=SPAR S50			[==>]	[4]
	11		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F125W	NSAMP=14; SAMP-SEQ=SPAR S50	POS TARG 0.542,0. 182		[==>]	[4]
	12		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F125W	NSAMP=9; SAMP-SEQ=SPAR S100	POS TARG 0.339,0. 485		[==>]	[4]
	13		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F125W	NSAMP=9; SAMP-SEQ=SPAR S100	POS TARG -0.203,0 .303		[==>]	[4]
	14		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F160W	NSAMP=15; SAMP-SEQ=SPAR S50			[==>]	[5]
	15		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F160W	NSAMP=14; SAMP-SEQ=SPAR S50	POS TARG 0.542,0. 182		[==>]	[5]

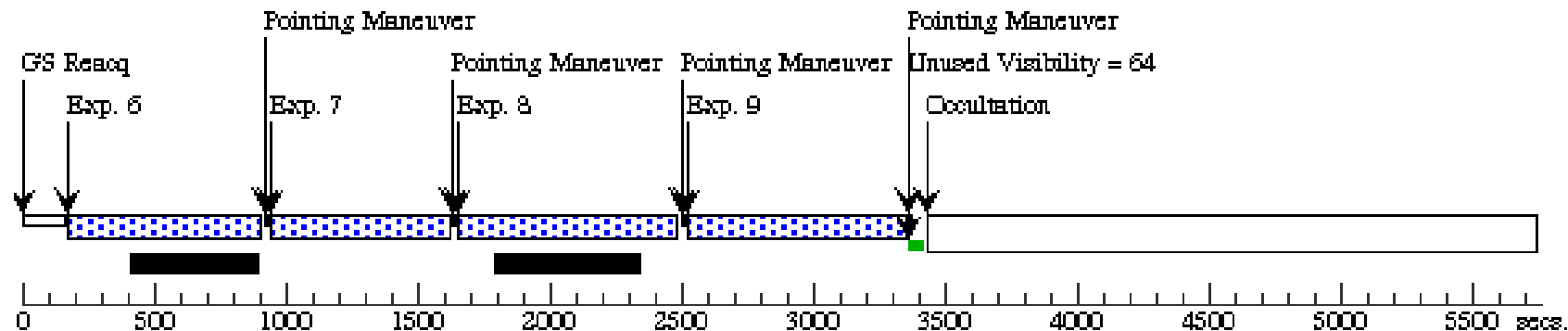
Proposal 12905 - Visit 01 - Unveiling the structure of the farthest galaxy protocluster: WFC3 imaging of a z~8 galaxy overdensity

16	(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX F160W	NSAMP=9; SAMP-SEQ=SPAR S100	POS TARG 0.339,0. 485	[==>]	[5]
17	(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX F160W	NSAMP=9; SAMP-SEQ=SPAR S100	POS TARG -0.203,0 .303	[==>]	[5]



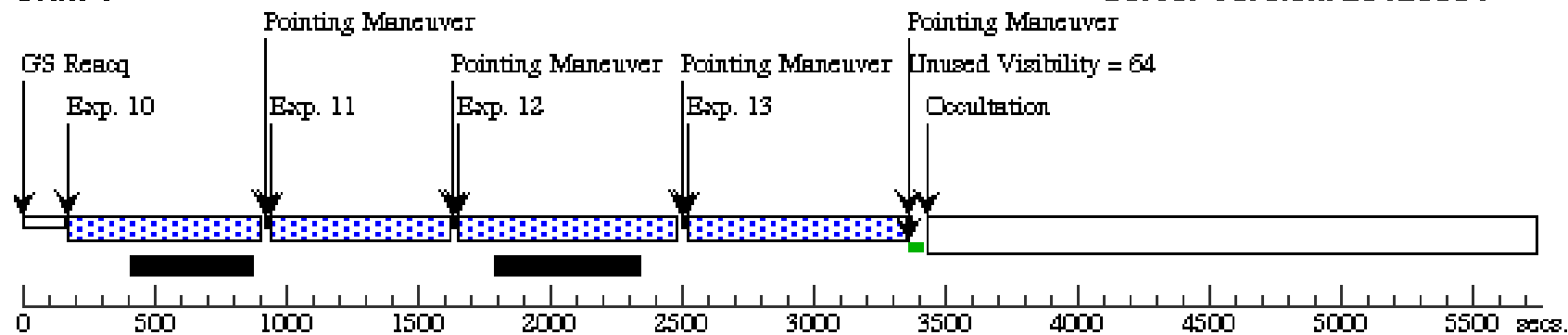
Orbit 3

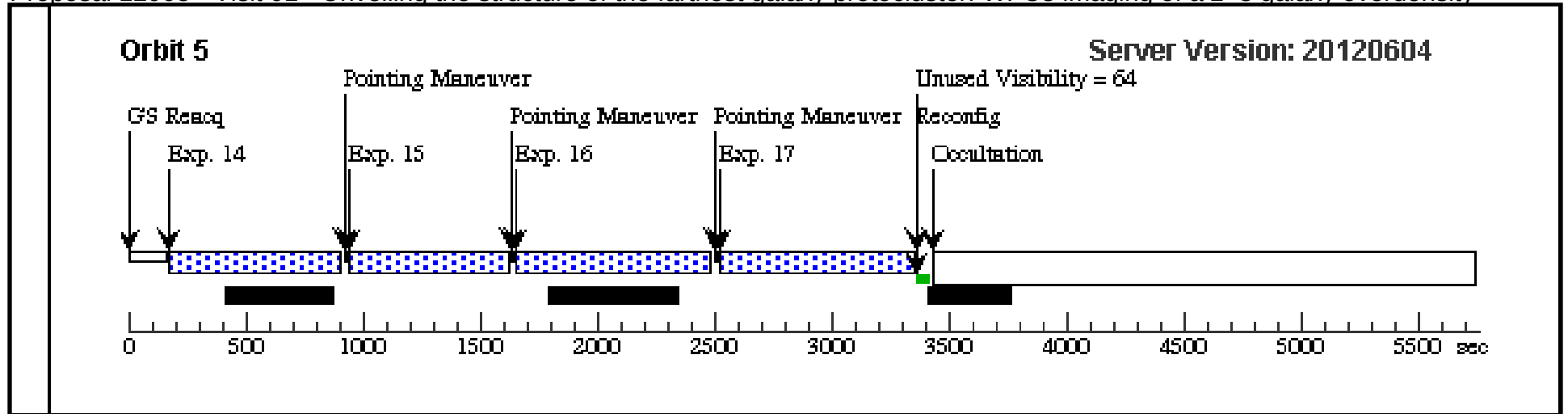
Server Version: 20120604



Orbit 4

Server Version: 20120604





Proposal 12905 - Visit 02 - Unveiling the structure of the farthest galaxy protocluster: WFC3 imaging of a z~8 galaxy overdensity

Visit	Proposal 12905, Visit 02, implementation				Sat Jul 14 01:08:21 GMT 2012	
	Diagnostic Status: No Diagnostics					
	Scientific Instruments: WFC3/IR, WFC3/UVIS					
	Special Requirements: SAME ORIENT AS 01; BEFORE 01-MAR-2013:00:00:00					
Patterns	#	Primary Pattern		Secondary Pattern	Exposures	
	(1)	Pattern Type=WFC3-UVIS-GAP-LINE Coordinate Frame=POS-TARG Purpose=MOSAIC Pattern Orientation=85.759 Number Of Points=4 Angle Between Sides= Point Spacing=2.414 Center Pattern=true Line Spacing=			(1)	
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	BORG58- PROTOCLUSTER	RA: 14 36 50.5680 (219.2107000d) Dec: +50 43 33.60 (50.72600d) Equinox: J2000		V=28+/-1	Reference Frame: ICRS

Proposal 12905 - Visit 02 - Unveiling the structure of the farthest galaxy protocluster: WFC3 imaging of a z~8 galaxy overdensity

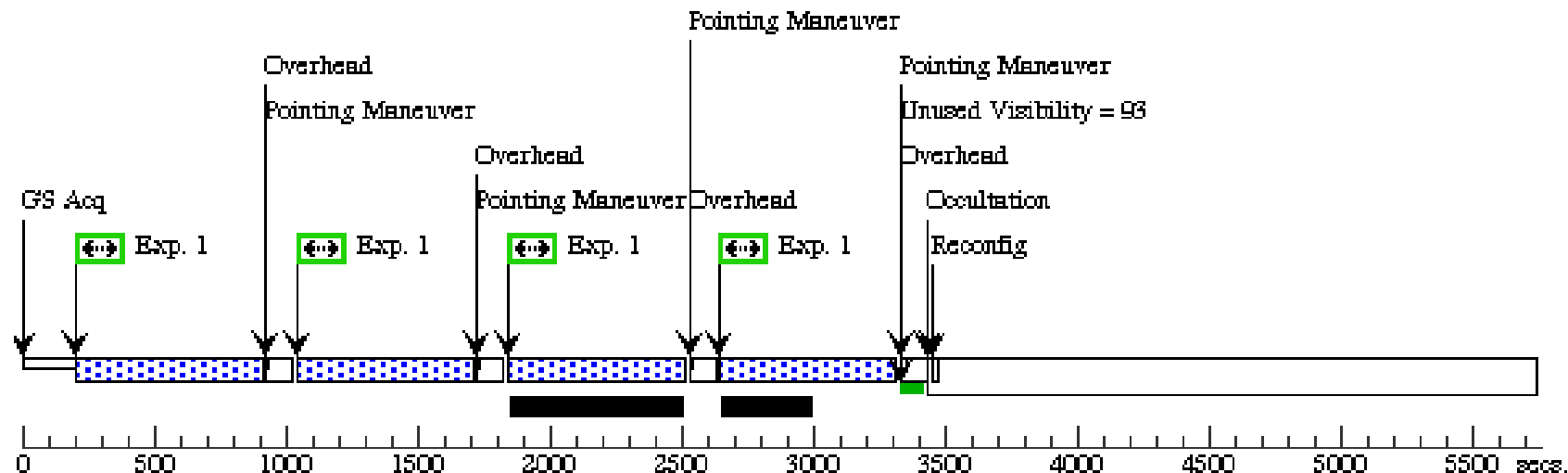
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(1) BORG58-PROT OCLUSTER	WFC3/UVIS, ACCUM, UVIS-FIX	F606W		GS ACQ SCENARI O SINGLE	Pattern 1, Exps 1-1 i n Visit 02 (1)	676 Secs [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]
	2		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F098M	NSAMP=15; SAMP-SEQ=SPAR S50			[==>]	[2]
	3		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F098M	NSAMP=14; SAMP-SEQ=SPAR S50	POS TARG 0.542,0.182		[==>]	[2]
	4		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F098M	NSAMP=9; SAMP-SEQ=SPAR S100	POS TARG 0.339,0.485		[==>]	[2]
	5		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F098M	NSAMP=9; SAMP-SEQ=SPAR S100	POS TARG -0.203,0.303		[==>]	[2]
	6		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=15; SAMP-SEQ=SPAR S50			[==>]	[3]
	7		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=14; SAMP-SEQ=SPAR S50	POS TARG 0.542,0.182		[==>]	[3]
	8		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=9; SAMP-SEQ=SPAR S100	POS TARG 0.339,0.485		[==>]	[3]
	9		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=9; SAMP-SEQ=SPAR S100	POS TARG -0.203,0.303		[==>]	[3]
	10		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F125W	NSAMP=15; SAMP-SEQ=SPAR S50			[==>]	[4]
	11		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F125W	NSAMP=14; SAMP-SEQ=SPAR S50	POS TARG 0.542,0.182		[==>]	[4]
	12		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F125W	NSAMP=9; SAMP-SEQ=SPAR S100	POS TARG 0.339,0.485		[==>]	[4]
	13		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F125W	NSAMP=9; SAMP-SEQ=SPAR S100	POS TARG -0.203,0.303		[==>]	[4]
	14		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F160W	NSAMP=15; SAMP-SEQ=SPAR S50			[==>]	[5]
	15		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F160W	NSAMP=14; SAMP-SEQ=SPAR S50	POS TARG 0.542,0.182		[==>]	[5]

Proposal 12905 - Visit 02 - Unveiling the structure of the farthest galaxy protocluster: WFC3 imaging of a z~8 galaxy overdensity

16	(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX F160W	NSAMP=9; SAMP-SEQ=SPAR S100	POS TARG 0.339,0. 485	[==>]	[5]
17	(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX F160W	NSAMP=9; SAMP-SEQ=SPAR S100	POS TARG -0.203,0 .303	[==>]	[5]

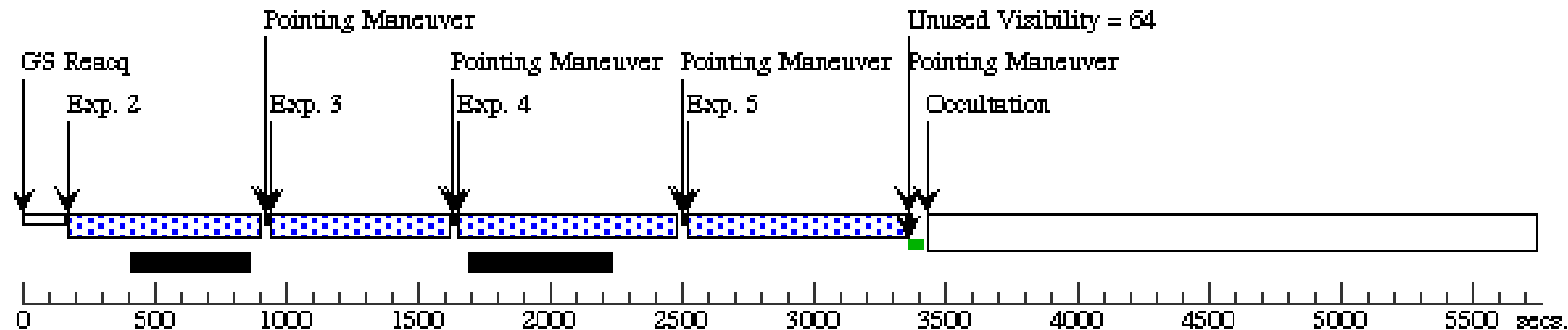
Orbit 1

Server Version: 20120604



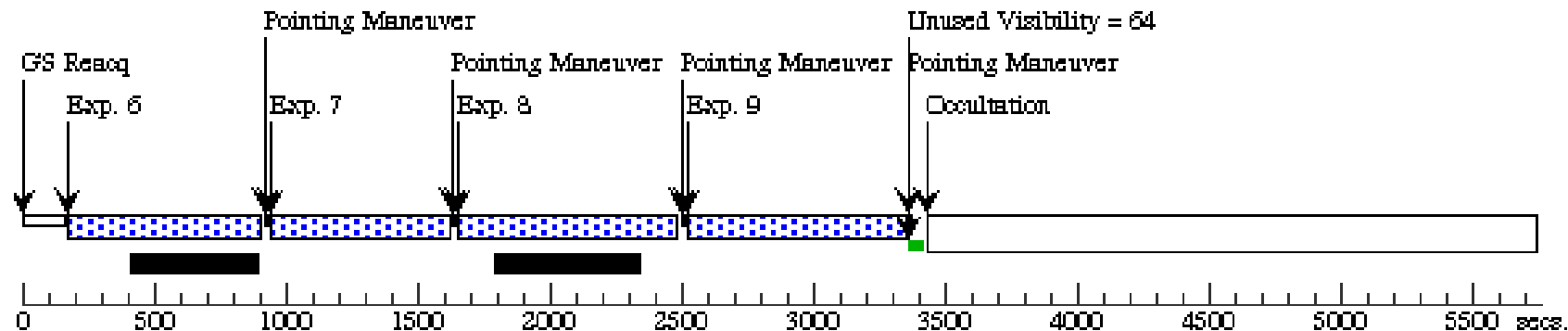
Orbit 2

Server Version: 20120604



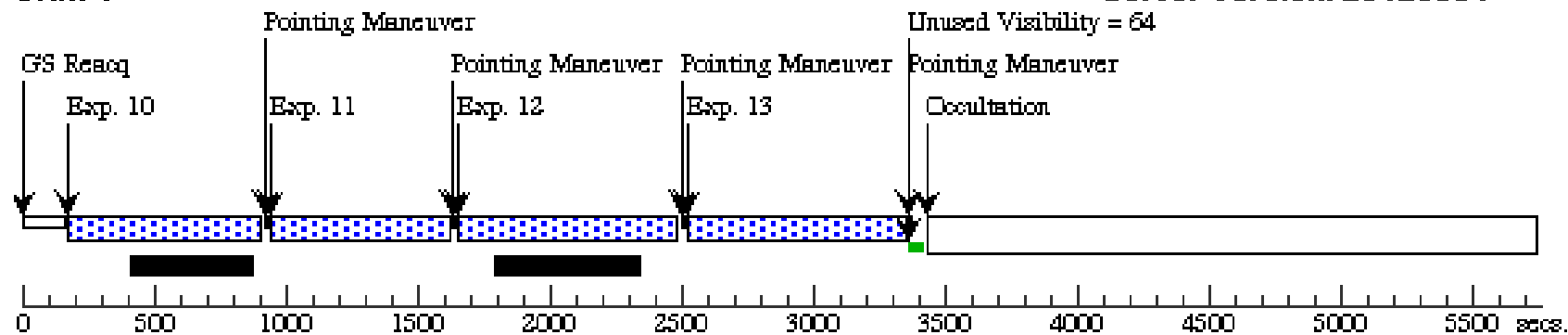
Orbit 3

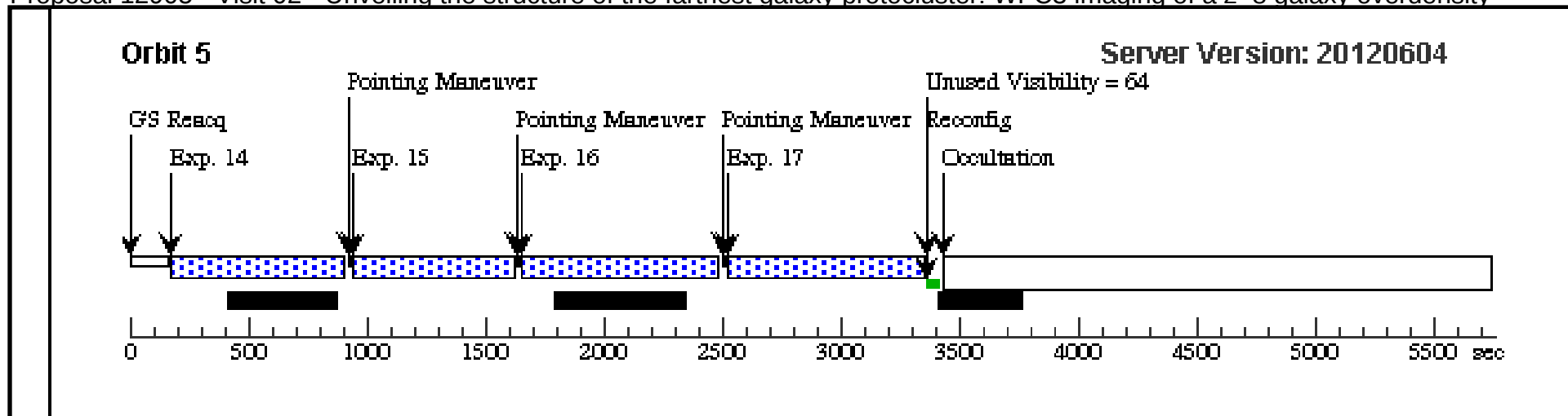
Server Version: 20120604



Orbit 4

Server Version: 20120604





Proposal 12905 - Visit 03 - Unveiling the structure of the farthest galaxy protocluster: WFC3 imaging of a z~8 galaxy overdensity

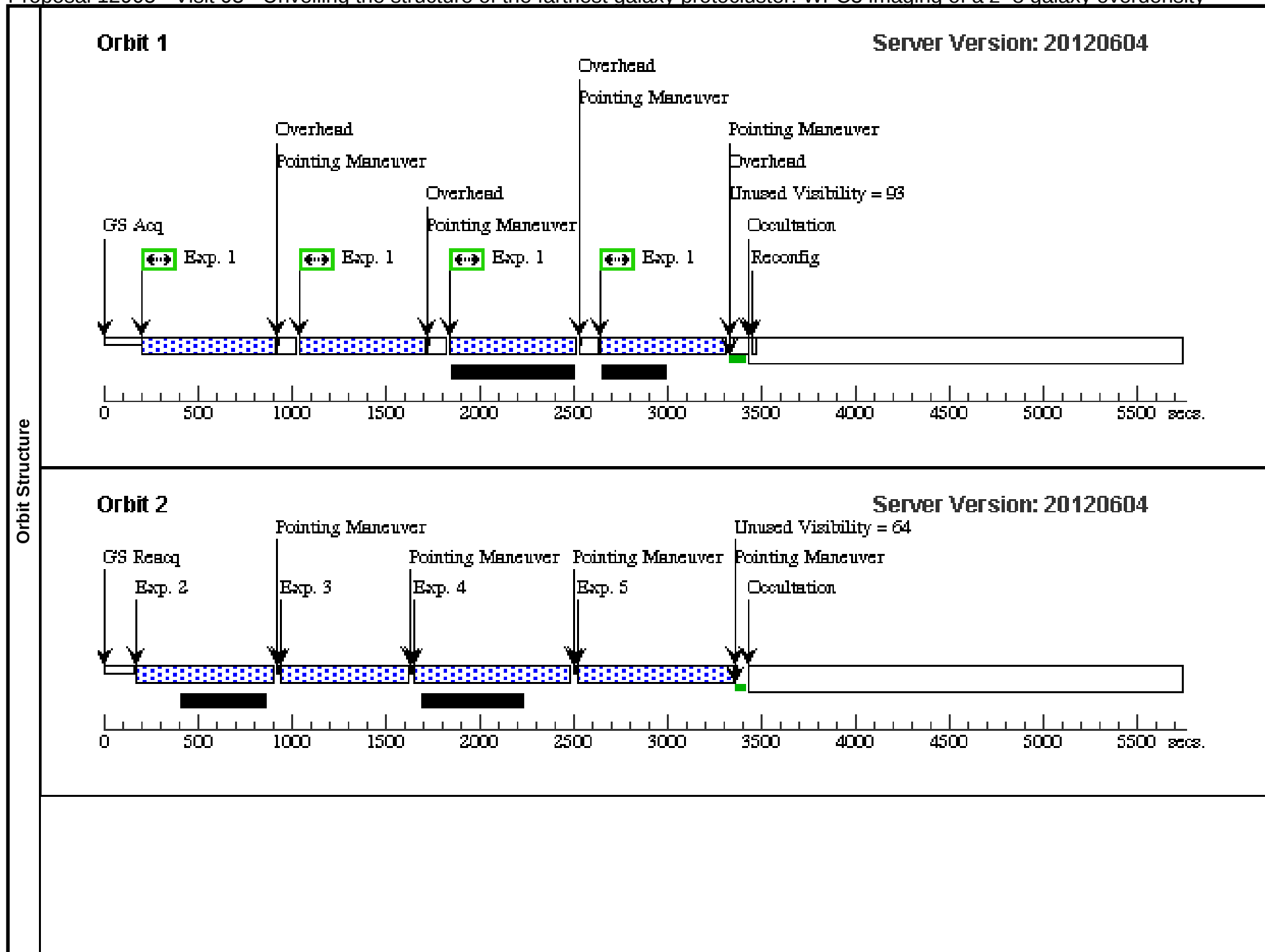
Visit	Proposal 12905, Visit 03, implementation				Sat Jul 14 01:08:26 GMT 2012	
	Diagnostic Status: No Diagnostics					
	Scientific Instruments: WFC3/IR, WFC3/UVIS					
	Special Requirements: SAME ORIENT AS 01; BEFORE 01-MAR-2013:00:00:00					
Patterns	#	Primary Pattern		Secondary Pattern	Exposures	
	(1)	Pattern Type=WFC3-UVIS-GAP-LINE Coordinate Frame=POS-TARG Purpose=MOSAIC Pattern Orientation=85.759 Number Of Points=4 Angle Between Sides= Point Spacing=2.414 Center Pattern=true Line Spacing=			(1)	
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	BORG58- PROTOCLUSTER	RA: 14 36 50.5680 (219.2107000d) Dec: +50 43 33.60 (50.72600d) Equinox: J2000		V=28+/-1	Reference Frame: ICRS

Proposal 12905 - Visit 03 - Unveiling the structure of the farthest galaxy protocluster: WFC3 imaging of a z~8 galaxy overdensity

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(1) BORG58-PROT OCLUSTER	WFC3/UVIS, ACCUM, UVIS-FIX	F606W		GS ACQ SCENARI O SINGLE	Pattern 1, Exps 1-1 i n Visit 03 (1)	676 Secs [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]
	2		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F098M	NSAMP=15; SAMP-SEQ=SPAR S50			[==>]	[2]
	3		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F098M	NSAMP=14; SAMP-SEQ=SPAR S50	POS TARG 0.542,0.182		[==>]	[2]
	4		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F098M	NSAMP=9; SAMP-SEQ=SPAR S100	POS TARG 0.339,0.485		[==>]	[2]
	5		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F098M	NSAMP=9; SAMP-SEQ=SPAR S100	POS TARG -0.203,0.303		[==>]	[2]
	6		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=15; SAMP-SEQ=SPAR S50			[==>]	[3]
	7		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=14; SAMP-SEQ=SPAR S50	POS TARG 0.542,0.182		[==>]	[3]
	8		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=9; SAMP-SEQ=SPAR S100	POS TARG 0.339,0.485		[==>]	[3]
	9		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=9; SAMP-SEQ=SPAR S100	POS TARG -0.203,0.303		[==>]	[3]
	10		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F125W	NSAMP=15; SAMP-SEQ=SPAR S50			[==>]	[4]
	11		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F125W	NSAMP=14; SAMP-SEQ=SPAR S50	POS TARG 0.542,0.182		[==>]	[4]
	12		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F125W	NSAMP=9; SAMP-SEQ=SPAR S100	POS TARG 0.339,0.485		[==>]	[4]
	13		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F125W	NSAMP=9; SAMP-SEQ=SPAR S100	POS TARG -0.203,0.303		[==>]	[4]
	14		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F160W	NSAMP=15; SAMP-SEQ=SPAR S50			[==>]	[5]
	15		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F160W	NSAMP=14; SAMP-SEQ=SPAR S50	POS TARG 0.542,0.182		[==>]	[5]

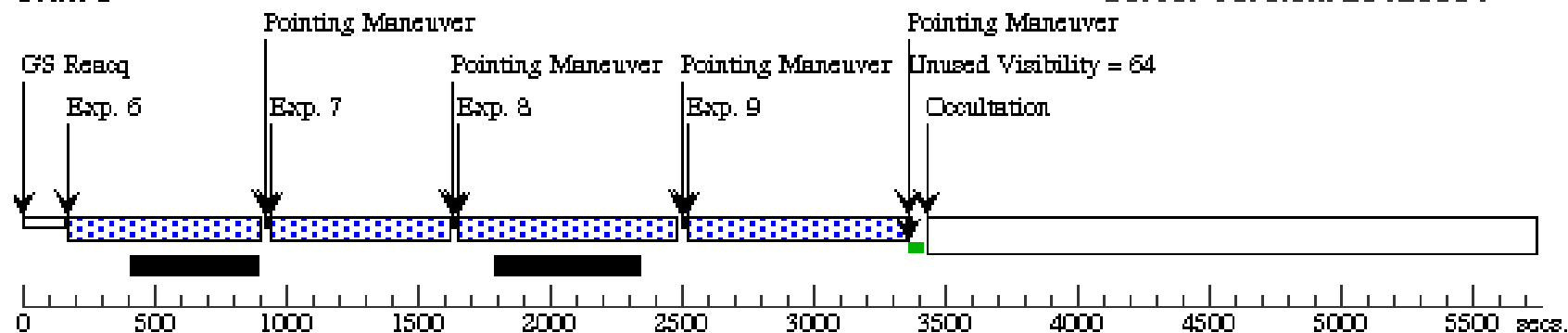
Proposal 12905 - Visit 03 - Unveiling the structure of the farthest galaxy protocluster: WFC3 imaging of a z~8 galaxy overdensity

16	(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX F160W	NSAMP=9; SAMP-SEQ=SPAR S100	POS TARG 0.339,0. 485	[==>]	[5]
17	(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX F160W	NSAMP=9; SAMP-SEQ=SPAR S100	POS TARG -0.203,0 .303	[==>]	[5]



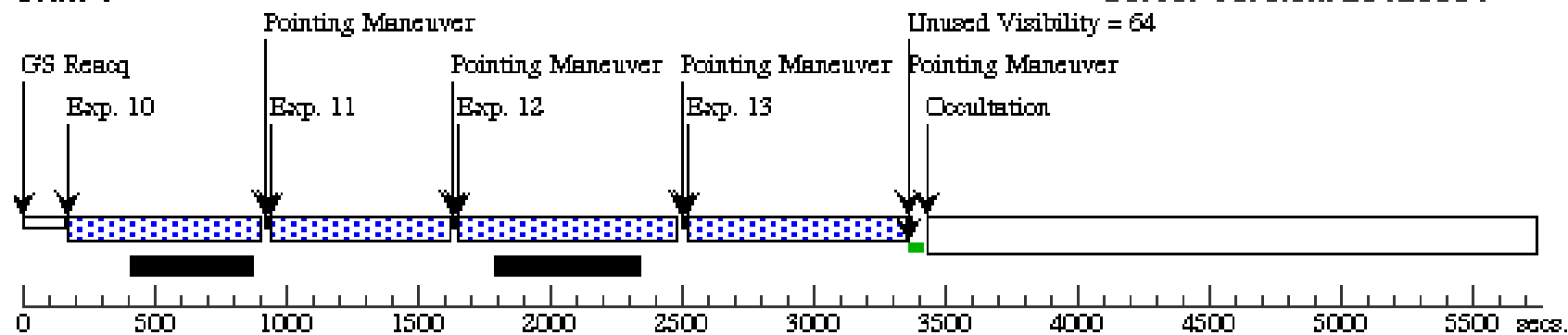
Orbit 3

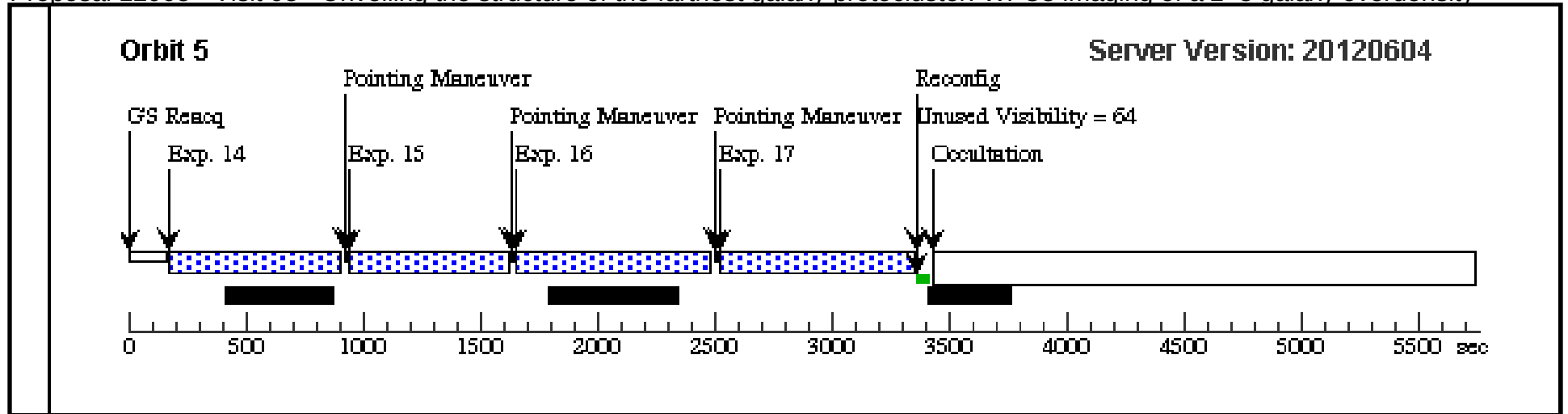
Server Version: 20120604



Orbit 4

Server Version: 20120604





Proposal 12905 - Visit 04 - Unveiling the structure of the farthest galaxy protocluster: WFC3 imaging of a z~8 galaxy overdensity

Visit	Proposal 12905, Visit 04, implementation Sat Jul 14 01:08:30 GMT 2012									
	Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR, WFC3/UVIS Special Requirements: SAME ORIENT AS 01; BEFORE 01-MAR-2013:00:00:00									
Patterns	#	Primary Pattern				Secondary Pattern				Exposures
	(1)	Pattern Type=WFC3-UVIS-GAP-LINE Coordinate Frame=POS-TARG Purpose=MOSAIC Pattern Orientation=85.759 Number Of Points=4 Angle Between Sides= Point Spacing=2.414 Center Pattern=true Line Spacing=								(1)
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous	
	(1)	BORG58-PROTOCLUSTER	RA: 14 36 50.5680 (219.2107000d) Dec: +50 43 33.60 (50.72600d) Equinox: J2000				V=28+/-1		Reference Frame: ICRS	
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(1) BORG58-PROT OCLUSTER	WFC3/UVIS, ACCUM, UVIS-FIX	F606W		GS ACQ SCENARI O SINGLE	Pattern 1, Exps 1-1 i n Visit 04 (1)	676 Secs [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]
	2		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F098M	NSAMP=15; SAMP-SEQ=SPAR S50			[==>]	[2]
	3		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F098M	NSAMP=14; SAMP-SEQ=SPAR S50	POS TARG 0.542,0.182		[==>]	[2]
	4		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F098M	NSAMP=9; SAMP-SEQ=SPAR S100	POS TARG 0.339,0.485		[==>]	[2]
	5		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F098M	NSAMP=9; SAMP-SEQ=SPAR S100	POS TARG -0.203,0.303		[==>]	[2]
	6		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F098M	NSAMP=15; SAMP-SEQ=SPAR S50			[==>]	[3]
	7		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F098M	NSAMP=14; SAMP-SEQ=SPAR S50	POS TARG 0.542,0.182		[==>]	[3]
	8		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F098M	NSAMP=9; SAMP-SEQ=SPAR S100	POS TARG 0.339,0.485		[==>]	[3]
	9		(1) BORG58-PROT OCLUSTER	WFC3/IR, MULTIACCUM, IR-FIX	F098M	NSAMP=9; SAMP-SEQ=SPAR S100	POS TARG -0.203,0.303		[==>]	[3]

