



## 12009 - Anatomy of a merger: the curious case of MACS J0417.5-1154

Cycle: 17, 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) MACSJ0417.5-1154	WFC3/UVIS	3	10-Feb-2011 21:01:02.0	yes
51	(1) MACSJ0417.5-1154	WFC3/UVIS	1	10-Feb-2011 21:01:08.0	yes
52	(1) MACSJ0417.5-1154	WFC3/UVIS	1	10-Feb-2011 21:01:11.0	yes
03	(1) MACSJ0417.5-1154	ACS/WFC	1	10-Feb-2011 21:01:14.0	yes

6 Total Orbits Used

### ABSTRACT

MACS J0417.5-1154 is a remarkable merger of a very massive cluster and a smaller subcluster. A previous 11 ksec Chandra exposure shows the hot gas distribution to appear distinctly comet-like: the peak is centered on the cD galaxy of the main cluster; the tail, however, extends several hundred kpc and encompasses a pair of giant ellipticals. Optical imaging reveals a bridge of intra-cluster light between the three galaxies, strengthening the hypothesis that this is a merger system with a low impact parameter, seen after pericentric passage. The proposed 80 ksec Chandra observation will allow us to map the detailed thermodynamic state of the system, to study how the merging process affects the cluster cores, and investigate the origin and state of the stripped gas in the tail.

### **OBSERVING DESCRIPTION**

This is an imaging program of the galaxy cluster MACS J0417.5-1154, with the aim to reconstruct the mass distribution at the core from gravitational lensing.

The primary aim is a weak lensing mass reconstruction. For the weak lensing analysis, we will observe the target for 3 orbits with WFC3 in F606W. Each orbit is split into 4 exposures of 596s each. All exposures are dithered along a LINE pattern, aiming to close the chip gap, and achieve 1/2 pixel resolution. Since we effectively have 12 exposures, we observe with CR-SPLIT=NO.

MACS J0417.5-1154 is a strong lensing cluster, and in order to identify further multiple image systems, we plan to observe it with a second filter, F814W. Because of its higher throughput, we use ACS for this single-orbit observation. We take 5 exposures along a LINE pattern, again closing the chip gap and aiming for 1/2 pixel resolution.

For a high S/N weak lensing mass map and the search for multiple image systems we need the highest depth reachable within the given observing time. Hence we require the LOW-SKY special requirement for the whole program.

The orientation constraints and the POS TARG of the ACS observation are chosen to avoid the bright stars in the field.

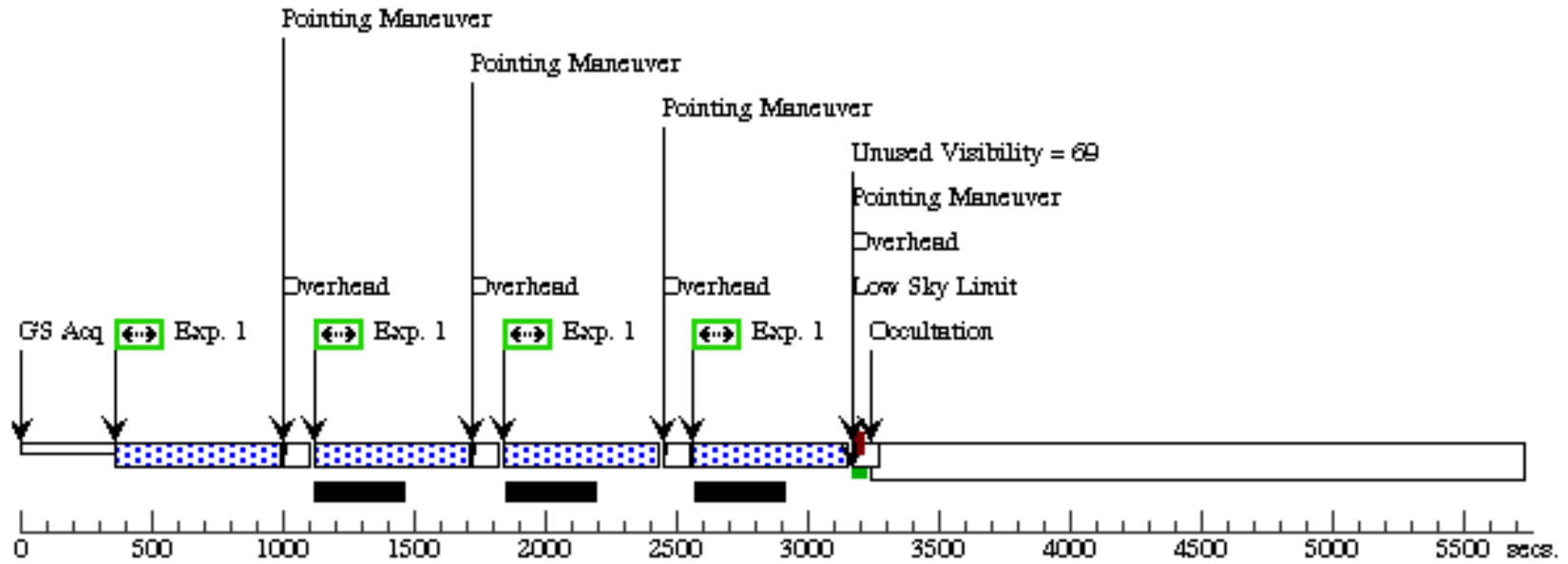
Proposal 12009 - Visit 01 - Anatomy of a merger: the curious case of MACS J0417.5-1154

Fri Feb 11 02:01:18 GMT 2011

Visit	<b>Proposal 12009, Visit 01, failed</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/UVIS Special Requirements: ORIENT 320.0D TO 353.0 D; ORIENT 136.0D TO 169.0 D; ORIENT 59.0D TO 80.0 D; ORIENT 236.0D TO 260.0 D									
	Patterns	#	Primary Pattern			Secondary Pattern			Exposures	
		(5)	Pattern Type=LINE Purpose=DITHER Number Of Points=12 Point Spacing=1.4163 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=93.9 Angle Between Sides= Center Pattern=true						
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections		Fluxes	Miscellaneous			
	(1)	MACSJ0417.5-1154	RA: 04 17 32.9905 (64.3874604d) Dec: -11 54 22.54 (-11.90626d) Equinox: J2000			V=20	Reference Frame: ICRS			
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	(1) MACSJ0417.5-1154	(1) MACSJ0417.5-1154	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W	CR-SPLIT=NO	LOW-SKY	Pattern 5, Exps 1-1 in Visit 01 (5)	596 Secs	
								[==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]		[1]
								[==>(Pattern 5)] [==>(Pattern 6)] [==>(Pattern 7)] [==>(Pattern 8)]		[2]
								[==>(Pattern 9)] [==>(Pattern 10)] [==>(Pattern 11)] [==>(Pattern 12)]		[3]

Orbit 1

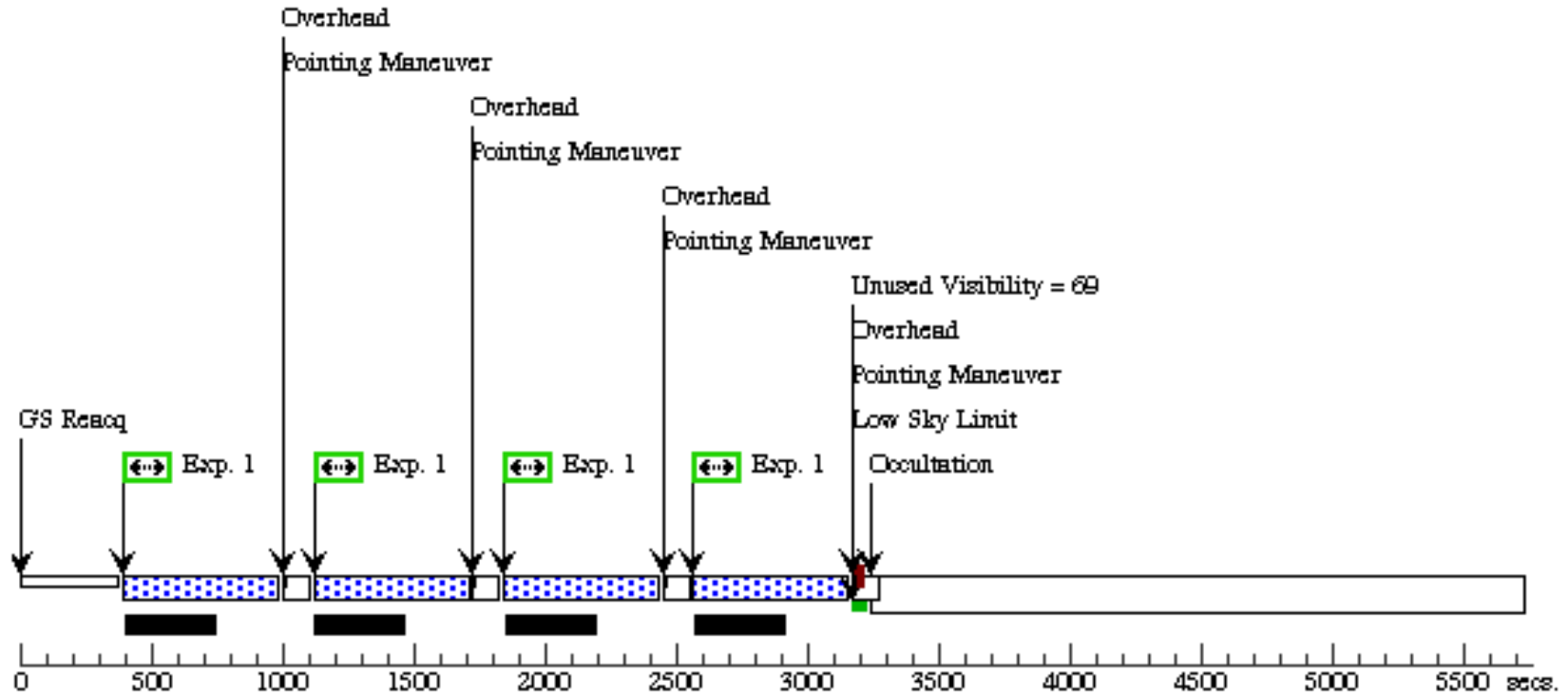
Server Version: 20100902

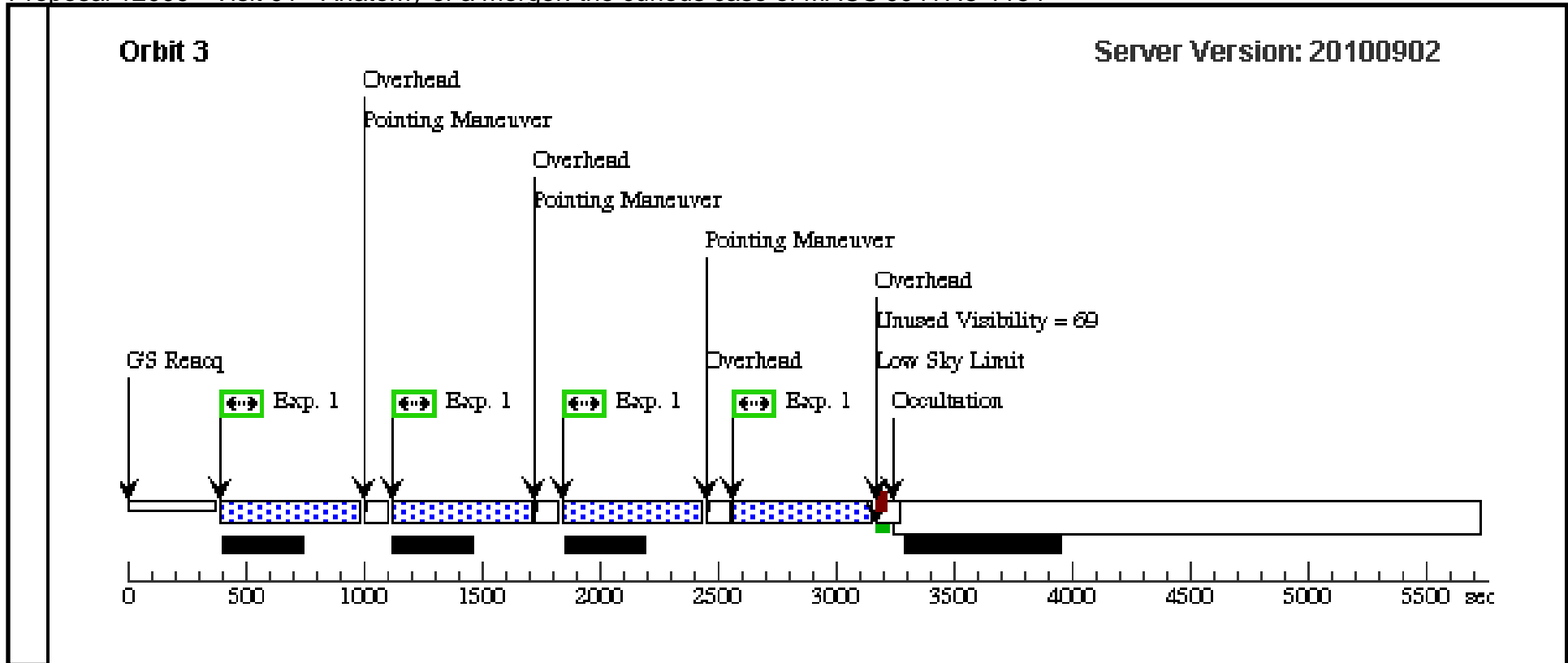


Orbit Structure

Orbit 2

Server Version: 20100902

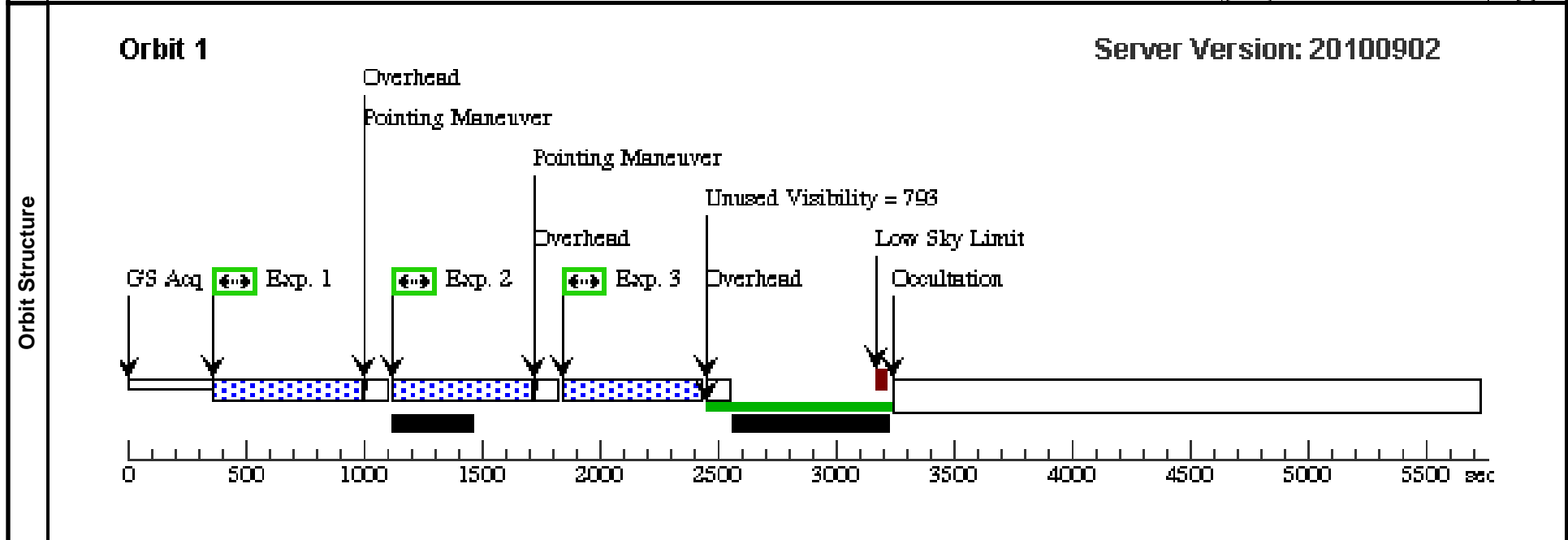




<b>Visit</b>	<b>Proposal 12009, Visit 51, implementation</b>				
	<b>Diagnostic Status: No Diagnostics</b>				
	Scientific Instruments: WFC3/UVIS				
	Special Requirements: ORIENT 60.8D TO 60.8 D				
<i>Comments: HOPR repeat of the first three exposures from visit 1.</i>					

<b>Fixed Targets</b>	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	MACSJ0417.5-1154	RA: 04 17 32.9905 (64.3874604d) Dec: -11 54 22.54 (-11.90626d) Equinox: J2000		V=20	Reference Frame: ICRS

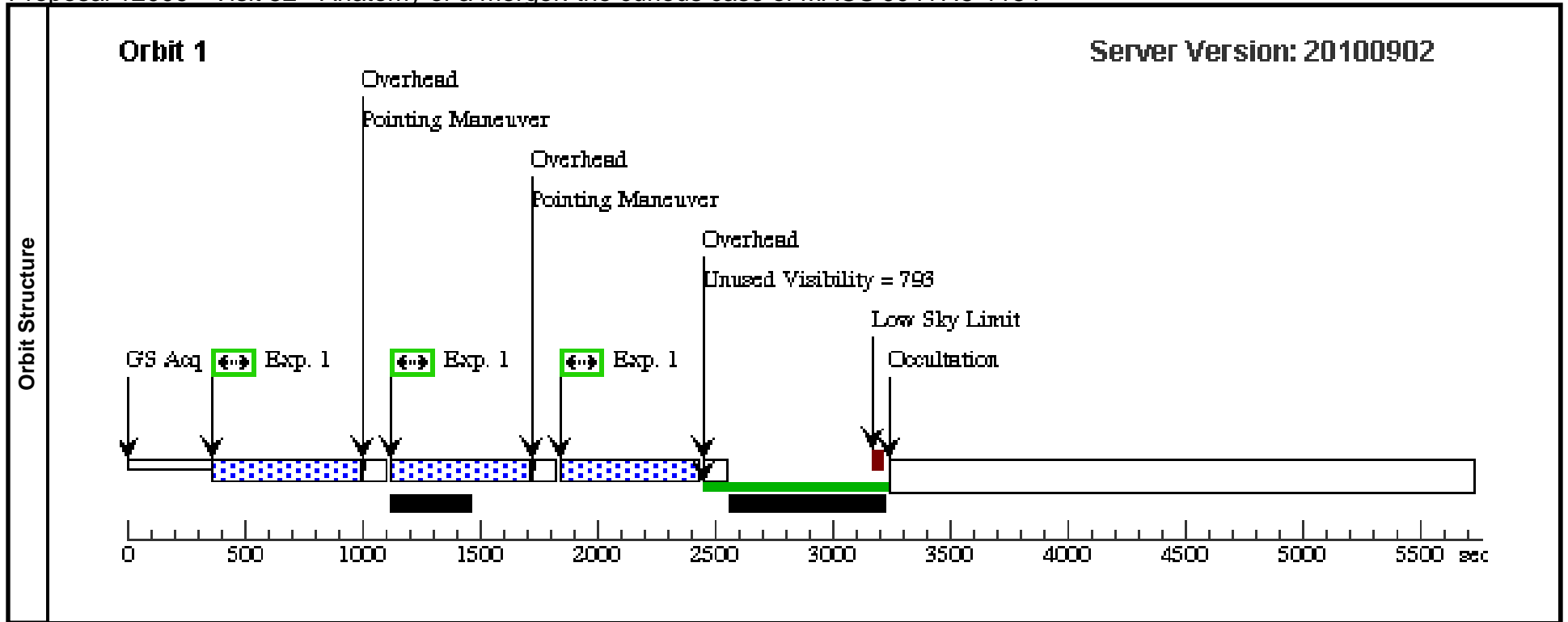
<b>Exposures</b>	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1		(1) MACSJ0417.5-154	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W	CR-SPLIT=NO	POS TARG 0,-8.0; LOW-SKY; GS ACQ SCENARI O BASE1B3		596 Secs [==>]	[1]
	2		(1) MACSJ0417.5-154	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W	CR-SPLIT=NO	POS TARG 0,-6.25; LOW-SKY		596 Secs [==>]	[1]
	3		(1) MACSJ0417.5-154	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W	CR-SPLIT=NO	POS TARG 0,-5.0; LOW-SKY		596 Secs [==>]	[1]



Proposal 12009 - Visit 52 - Anatomy of a merger: the curious case of MACS J0417.5-1154

Fri Feb 11 02:01:20 GMT 2011

<b>Visit</b>	<b>Proposal 12009, Visit 52</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/UVIS Special Requirements: ORIENT 82D TO 85 D Comments: HOPR repeat of the first three exposures from visit 1.									
	<b>Patterns</b>	<b>#</b>	<b>Primary Pattern</b>			<b>Secondary Pattern</b>			<b>Exposures</b>	
(11)		Pattern Type=LINE Purpose=DITHER Number Of Points=3 Point Spacing=1.4163 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=93.9 Angle Between Sides= Center Pattern=false					(1)		
<b>Fixed Targets</b>	<b>#</b>	<b>Name</b>	<b>Target Coordinates</b>	<b>Targ. Coord. Corrections</b>	<b>Fluxes</b>	<b>Miscellaneous</b>				
	(1)	MACSJ0417.5-1154	RA: 04 17 32.9905 (64.3874604d) Dec: -11 54 22.54 (-11.90626d) Equinox: J2000		V=20	Reference Frame: ICRS				
<b>Exposures</b>	<b>#</b>	<b>Label</b>	<b>Target</b>	<b>Config,Mode,Aperture</b>	<b>Spectral Els.</b>	<b>Opt. Params.</b>	<b>Special Reqs.</b>	<b>Groups</b>	<b>Exp. Time/[Actual Dur.]</b>	<b>Orbit</b>
	1	(1) MACSJ0417.5-1154	(1) MACSJ0417.5-1154	WFC3/UVIS, ACCUM, UVIS-CENTER	F606W	CR-SPLIT=NO	POS TARG 5.46942 6498794622,-4.7885 870148864385;	Pattern 11, Exps 1-1 in Visit 52 (11)	596 Secs [=>(Pattern 1)] [=>(Pattern 2)] [=>(Pattern 3)]	[1]



Proposal 12009 - Visit 03 - Anatomy of a merger: the curious case of MACS J0417.5-1154

Fri Feb 11 02:01:20 GMT 2011

<b>Visit</b>	Proposal 12009, Visit 03, completed <b>Diagnostic Status: Warning</b> Scientific Instruments: ACS/WFC Special Requirements: ORIENT 4.0D TO 34.0 D										
	(Exposure 1 (Pattern 10, Exps 1-1 in Visit 03) special requirements) Warning (Form): Be very careful mixing POS TARG and Center_Pattern = Yes										
<b>Diagnosics</b>											
<b>Patterns</b>	<b>#</b>	<b>Primary Pattern</b>				<b>Secondary Pattern</b>				<b>Exposures</b>	
	(10)	Pattern Type=ACS-WFC-DITHER- LINE Purpose=DITHER Number Of Points=5 Point Spacing=3.011 Line Spacing=				Coordinate Frame=POS-TARG Pattern Orientation=85.28 Angle Between Sides= Center Pattern=true				(1)	
<b>Fixed Targets</b>	<b>#</b>	<b>Name</b>	<b>Target Coordinates</b>		<b>Targ. Coord. Corrections</b>		<b>Fluxes</b>		<b>Miscellaneous</b>		
	(1)	MACSJ0417.5-1154	RA: 04 17 32.9905 (64.3874604d) Dec: -11 54 22.54 (-11.90626d) Equinox: J2000				V=20		Reference Frame: ICRS		
<b>Exposures</b>	<b>#</b>	<b>Label</b>	<b>Target</b>	<b>Config,Mode,Aperture</b>	<b>Spectral Els.</b>	<b>Opt. Params.</b>	<b>Special Reqs.</b>	<b>Groups</b>	<b>Exp. Time/[Actual Dur.]</b>		<b>Orbit</b>
	1		(1) MACSJ0417.5-1154	ACS/WFC, ACCUM, WFCENTER	F814W	CR-SPLIT=NO	POS TARG 18.2445 9605459966,16.7960 19159186372; LOW-SKY	Pattern 10, Exps 1-1 in Visit 03 (10)	382 Secs [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)] [==>(Pattern 5)]		[1]

