



15610 - Probing Dark Matter and ICM Physics with Observations of the Dissociative Merging Cluster CIZA J0107.7+5408

Cycle: 26, 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) CIZA-J0107.7+5408-NE	ACS/WFC	3	27-Dec-2018 09:00:23.0	yes
02	(2) CIZA-J0107.7+5408-SW	ACS/WFC	3	27-Dec-2018 09:00:25.0	yes

6 Total Orbits Used

ABSTRACT

We propose a deep observation of the massive, low redshift, binary dissociative merging cluster CIZA J0107.7+5408. We will confirm and measure the properties of a merger shock front to constrain the dynamical state of the cluster, and use profiles across the shock front to constrain ICM microphysics. By combining X-ray constraints on the dynamical state with joint HST observations, will provide upper limits on the self-interaction cross section of dark matter competitive with or better than the current best limits. Joint VLA observations will allow us to determine the nature of the diffuse radio emission in this system, and derive shock Mach numbers that can be compared with the X-ray Mach numbers to help understand the formation mechanism of the radio sources.

OBSERVING DESCRIPTION

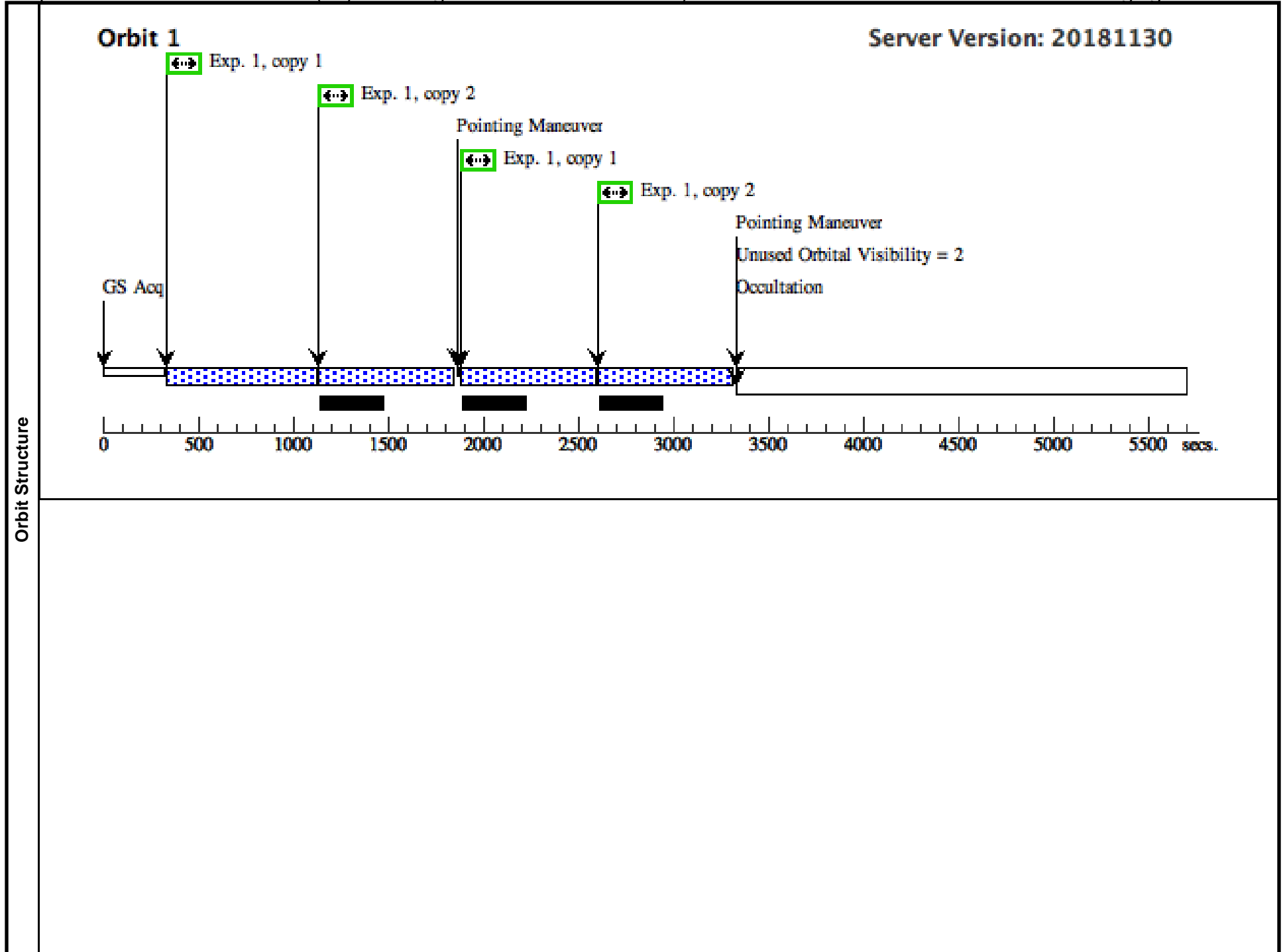
The goal of the joint HST observations is to accurately determine the weak lensing centroid of each subcluster. For this goal, the most efficient strategy is to focus the observations near the presumed centroids, i.e., near the galaxy centroids. Going deep in this area is essential, but covering a wider area is not. F814W is the best filter for deep weak-lensing observations, and this is our primary filter. We need at least one other filter to exclude cluster members and foreground sources from the weak-lensing analysis. The F606W filter straddles the 4000 Å break at the relevant redshift (0.19), and so is our choice.

We require only one ACS pointing per subcluster. Our experience with similar targets is that two orbits with ACS+F814W is sufficient to obtain a weak-lensing centroid accuracy of 7-9 arcsec. Given the relatively low redshift of CIZA 0107 ($z \sim 0.1$) we expect more background sources per square arcmin, but this advantage is largely canceled out by the greater Galactic extinction in this region. Therefore, we ask for two orbits per pointing. Since photometric measurements are less noisy than shape measurements, the source-selection F606W filter need not be as deep as the lensing filter, so we ask for one orbit per pointing with this filter, giving six orbits in total. The target has good visibility with HST at 58 min per orbit.

Proposal 15610 - NE Subcluster (01) - Probing Dark Matter and ICM Physics with Observations of the Dissociative Merging Cluster Cl...

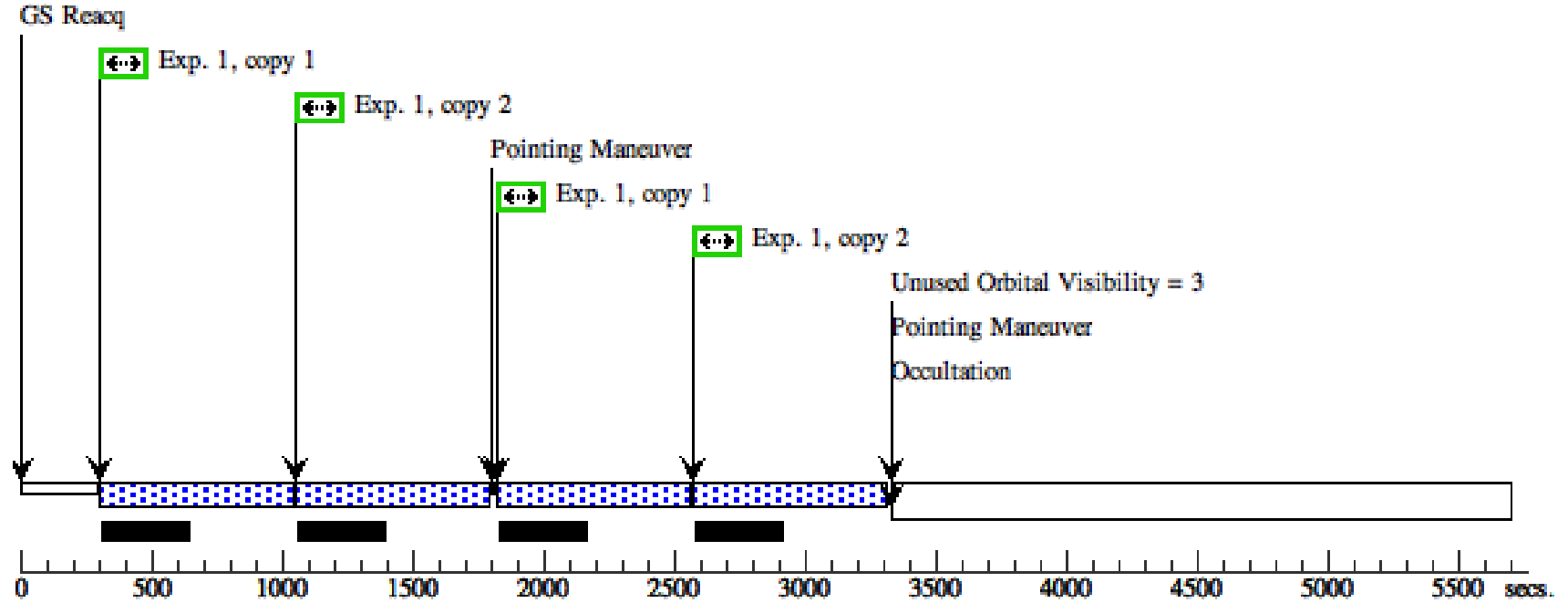
Thu Dec 27 14:00:26 GMT 2018

Visit	Proposal 15610, NE Subcluster (01), implementation Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: ORIENT 16.5D TO 77 D; ORIENT 105D TO 164 D; ORIENT 190D TO 256 D; ORIENT 282D TO 341 D <i>Comments: The point of the orientation requirements is to avoid nearby bright stars. We have no preference between the different roll ranges.</i>									
	#	Primary Pattern	Secondary Pattern	Exposures						
Patterns	(1)	Pattern Type=ACS-WFC-DITHER-LINE Coordinate Frame=POS-TARG Pattern Orientation=85.29 Purpose=DITHER Angle Between Sides= Number Of Points=4 Center Pattern=true Point Spacing=3.034 Line Spacing=		(2)						
	(2)	Pattern Type=ACS-WFC-DITHER-LINE Coordinate Frame=POS-TARG Pattern Orientation=85.29 Purpose=DITHER Angle Between Sides= Number Of Points=2 Center Pattern=false Point Spacing=3.034 Line Spacing=	Pattern Type=ACS-WFC-DITHER-LINE Coordinate Frame=POS-TARG Pattern Orientation=34.35 Purpose=DITHER Angle Between Sides= Number Of Points=2 Center Pattern=false Point Spacing=0.149 Line Spacing=	(1)						
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	CIZA-J0107.7+5408-NE	RA: 01 07 55.4265 (16.9809438d) Dec: +54 10 23.38 (54.17316d) Equinox: J2000		V=18+/-1	Reference Frame: ICRS				
<i>Comments:</i> Category=CLUSTER OF GALAXIES Description=[GALAXY PAIR, GRAVITATIONAL LENS, RICH CLUSTER]										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(1) CIZA-J0107.7+5408-NE	ACS/WFC, ACCUM, WFCENTER	F814W				Pattern 2, Exps 1-1 in NE Subcluster (01) (2)	600 Secs X 2 (4800 Secs) [=>586.0 Secs (Pattern 1,1, Copy 1)] [=>586.0 Secs (Pattern 1,1, Copy 2)] [=>586.0 Secs (Pattern 1,2, Copy 1)] [=>586.0 Secs (Pattern 1,2, Copy 2)]
									[=>614.0 Secs (Pattern 2,1, Copy 1)] [=>614.0 Secs (Pattern 2,1, Copy 2)] [=>614.0 Secs (Pattern 2,2, Copy 1)] [=>614.0 Secs (Pattern 2,2, Copy 2)]	[2]
	2		(1) CIZA-J0107.7+5408-NE	ACS/WFC, ACCUM, WFCENTER	F606W			Pattern 1, Exps 2-2 in NE Subcluster (01) (1)	600 Secs (2352 Secs) [=>588.0 Secs (Pattern 1)] [=>588.0 Secs (Pattern 2)] [=>588.0 Secs (Pattern 3)] [=>588.0 Secs (Pattern 4)]	[3]



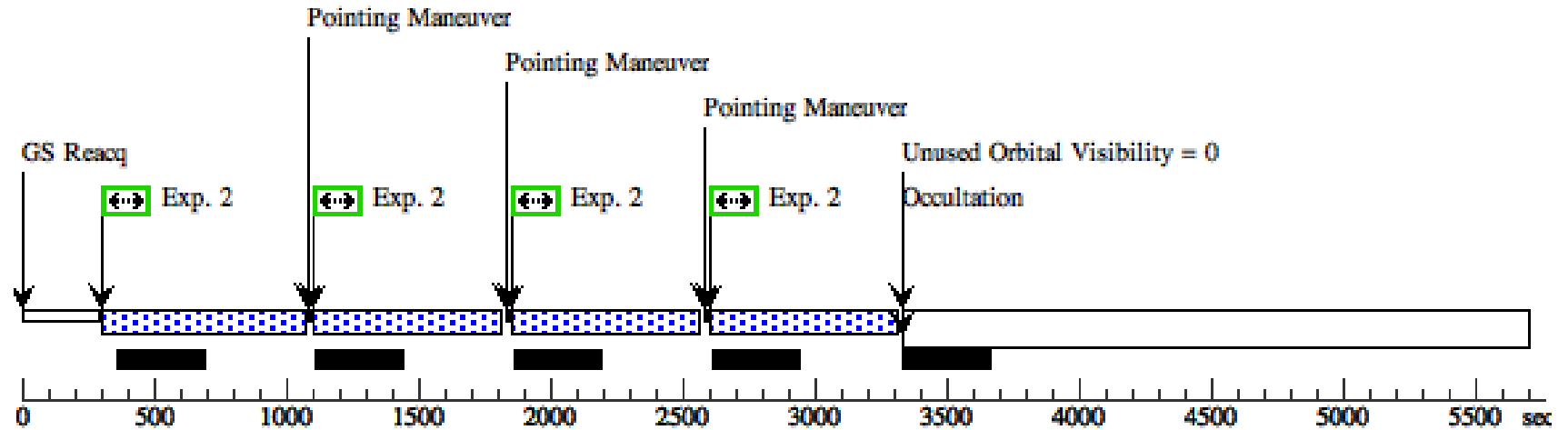
Orbit 2

Server Version: 20181130



Orbit 3

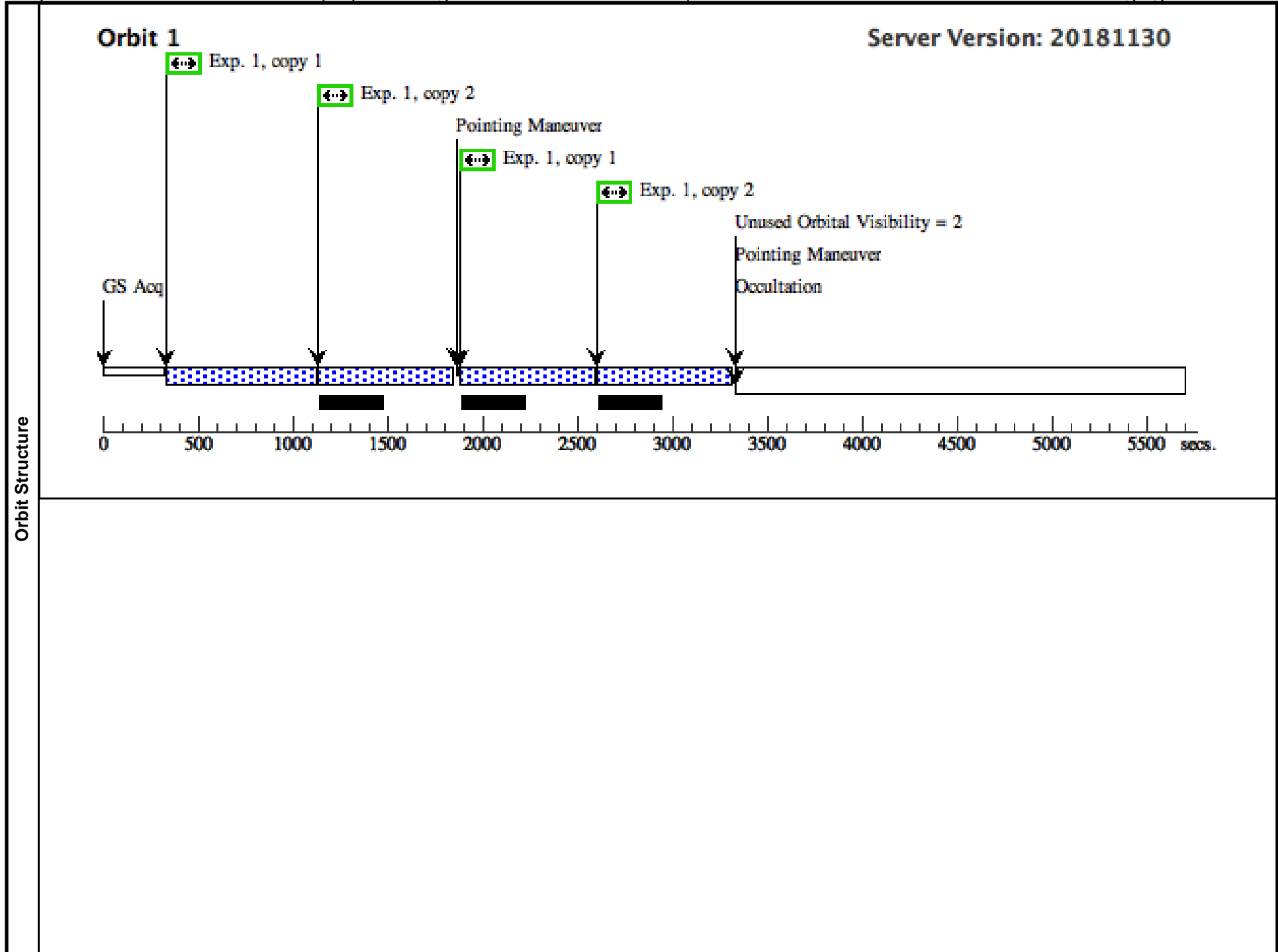
Server Version: 20181130



Proposal 15610 - SW Subcluster (02) - Probing Dark Matter and ICM Physics with Observations of the Dissociative Merging Cluster Cl...

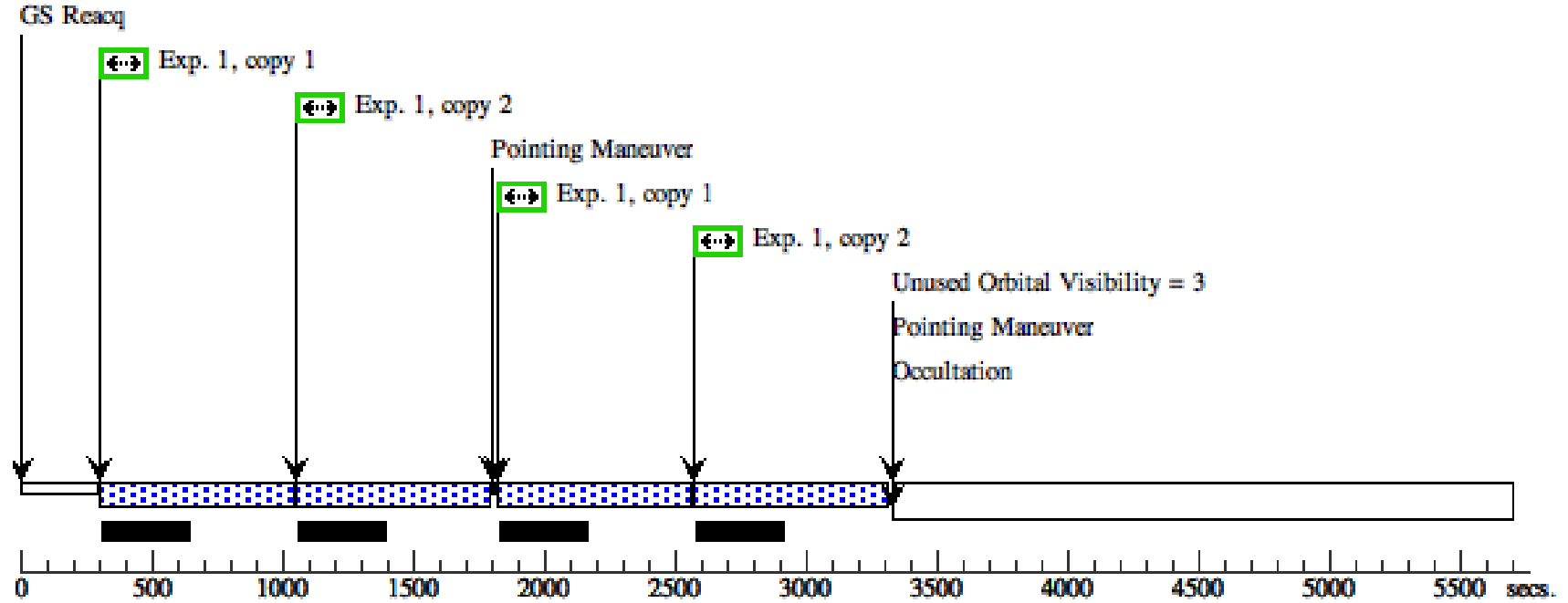
Thu Dec 27 14:00:26 GMT 2018

Visit	Proposal 15610, SW Subcluster (02), implementation Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: ORIENT 357D TO 74 D; ORIENT 95D TO 157 D; ORIENT 179D TO 249 D; ORIENT 279D TO 340 D <i>Comments: The point of the orientation requirements is to avoid nearby bright stars. We have no preference between the different roll ranges.</i>									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
		(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=4 Point Spacing=3.034 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.29 Angle Between Sides= Center Pattern=true		(2)				
	(2)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=3.034 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.29 Angle Between Sides= Center Pattern=false	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.149 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=34.35 Angle Between Sides= Center Pattern=false	(1)				
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(2)	CIZA-J0107.7+5408-SW	RA: 01 07 41.6400 (16.9235000d) Dec: +54 06 43.41 (54.11206d) Equinox: J2000		V=18+/-1	Reference Frame: ICRS				
<i>Comments:</i> Category=CLUSTER OF GALAXIES Description=[GALAXY PAIR, GRAVITATIONAL LENS, RICH CLUSTER]										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(2) CIZA-J0107.7+5408-SW	ACS/WFC, ACCUM, WFCENTER	F814W				Pattern 2, Exps 1-1 in SW Subcluster (02) (2)	600 Secs X 2 (4800 Secs) [=>586.0 Secs (Pattern 1,1, Copy 1)] [=>586.0 Secs (Pattern 1,1, Copy 2)] [=>586.0 Secs (Pattern 1,2, Copy 1)] [=>586.0 Secs (Pattern 1,2, Copy 2)]
									[=>614.0 Secs (Pattern 2,1, Copy 1)] [=>614.0 Secs (Pattern 2,1, Copy 2)] [=>614.0 Secs (Pattern 2,2, Copy 1)] [=>614.0 Secs (Pattern 2,2, Copy 2)]	[2]
	2		(2) CIZA-J0107.7+5408-SW	ACS/WFC, ACCUM, WFCENTER	F606W			Pattern 1, Exps 2-2 in SW Subcluster (02) (1)	600 Secs (2352 Secs) [=>588.0 Secs (Pattern 1)] [=>588.0 Secs (Pattern 2)] [=>588.0 Secs (Pattern 3)] [=>588.0 Secs (Pattern 4)]	[3]



Orbit 2

Server Version: 20181130



Orbit 3

Server Version: 20181130

