



## 14352 - Deep X-ray Observations of 3 exceptional high-z clusters of galaxies

Cycle: 23, 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) SPT-CLJ2043-5035	ACS/WFC	2	22-Sep-2015 21:16:31.0	yes
02	(1) SPT-CLJ2043-5035	ACS/WFC	2	22-Sep-2015 21:16:34.0	yes
03	(1) SPT-CLJ2043-5035	ACS/WFC	2	22-Sep-2015 21:16:36.0	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>
04	(1) SPT-CLJ2043-5035	ACS/WFC	2	22-Sep-2015 21:16:38.0	yes

8 Total Orbits Used

### **ABSTRACT**

We propose to obtain deep Chandra X-ray observations of 3 exceptional high- $z$  ( $z > 0.5$ ) clusters of galaxies, which stand out as extremely X-ray luminous ( $L_{\text{X-ray}} \gg 10^{44}$  erg/s), relaxed cool-core clusters with evidence of X-ray cavities and a previous epoch of astrophysical feedback. This proposal will double the number of  $z > 0.57$  clusters with deep Chandra observations. The observations will significantly help in our understanding of the evolution and formation of massive clusters, the role of active galactic nuclei in astrophysical feedback and the distribution of metals in clusters at high- $z$ , and will be used to place new constraints on the dark energy and cosmology. In summary, in just 425 ks, this proposal will advance several aspects of high- $z$  clusters physics.

### **OBSERVING DESCRIPTION**

In this joint Chandra+HST program the Chandra X-ray data are complemented with HST imaging in order to constrain the cluster masses and mass profiles using weak gravitational lensing. Two of the clusters already have the required HST imaging from earlier programs. Here we propose the missing observations for the third target.

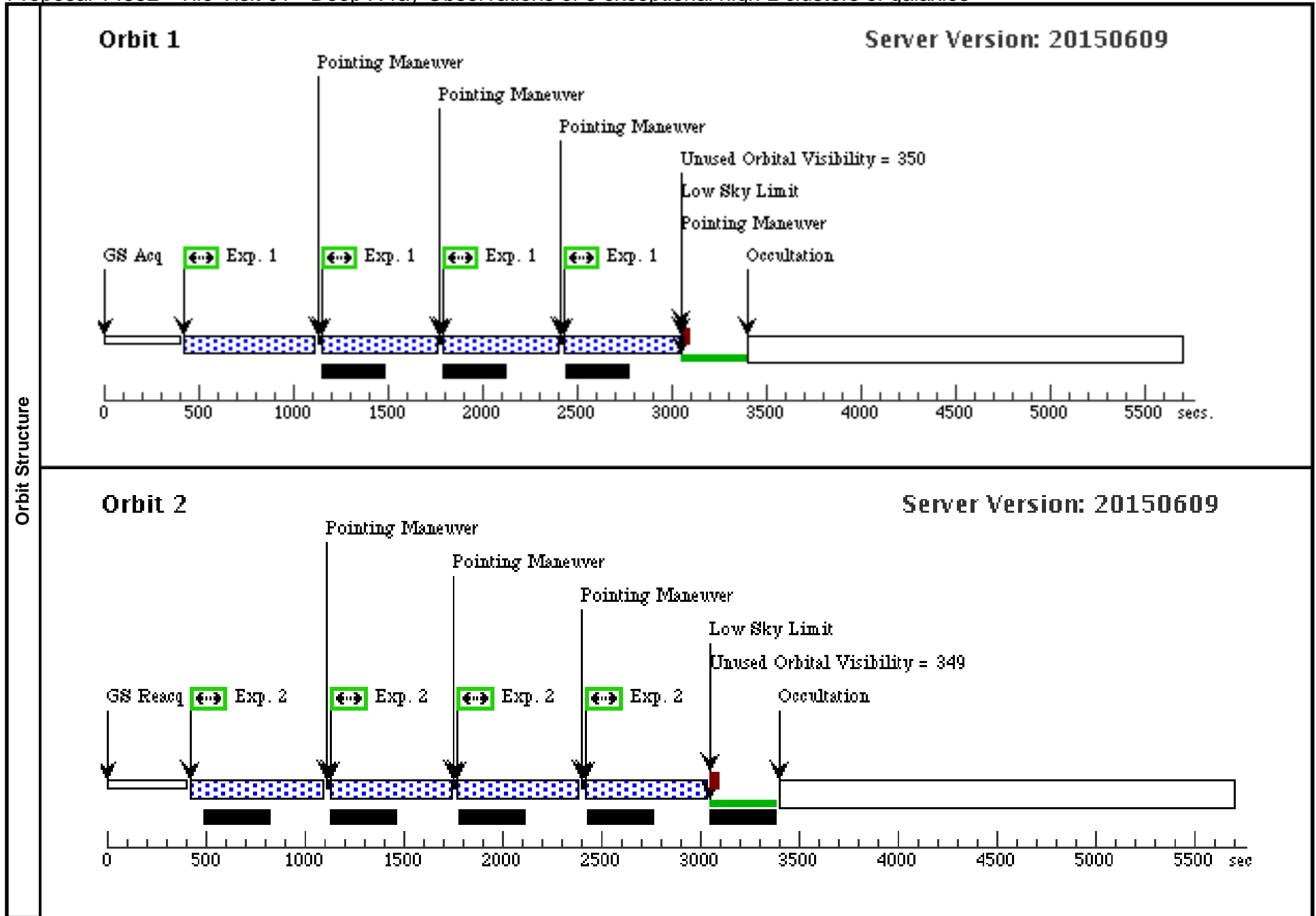
We propose to obtain a 2x2 ACS mosaic for the galaxy cluster SPT-CLJ2043-5035 in the F606W and F814W filters with small overlap between tiles. We propose separate visits for each tile, where observations will be conducted for each filter for one orbit, split into 4 exposures (with the default dither box) to facilitate cosmic ray removal. We request low sky conditions in order to maximize the signal-to-noise ratio in the weak lensing shape measurements.

In principle our science analysis does not place requirements on the orientation of the mosaic. However, we request to exclude orientations within  $\pm 20$  degrees of  $(55+n*90)$  degrees to ensure that a  $V=10.5$  star (SCAU000416) is well outside the field of view. Otherwise its scattered light would likely compromise the weak lensing shape measurements locally.

Proposal 14352 - Tile Visit 01 - Deep X-ray Observations of 3 exceptional high-z clusters of galaxies

Wed Sep 23 01:16:40 GMT 2015

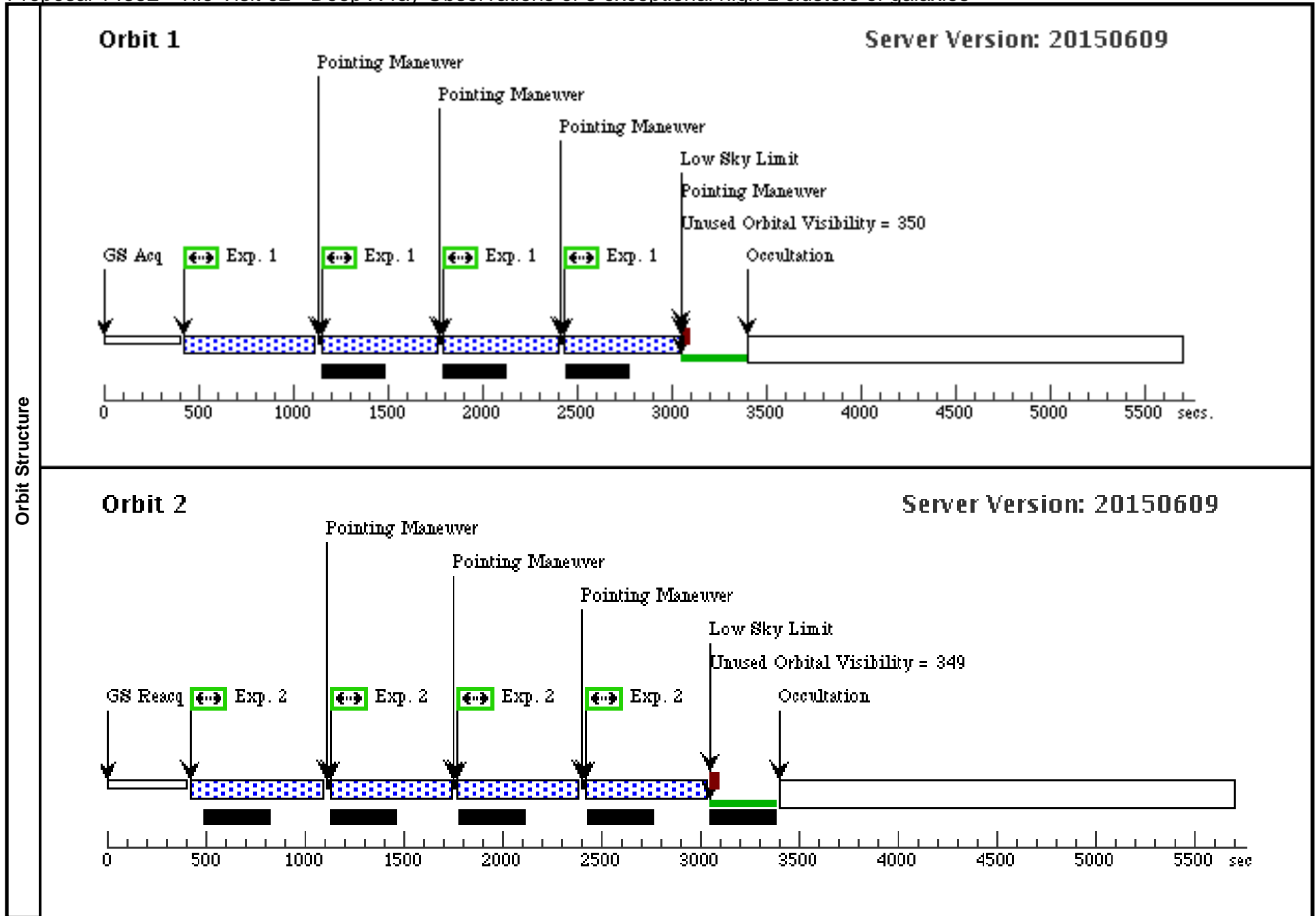
<b>Visit</b>	<b>Proposal 14352, Tile Visit 01</b> <b>Diagnostic Status: Warning</b> Scientific Instruments: ACS/WFC Special Requirements: ORIENT 0D TO 35 D; ORIENT 75D TO 125 D; ORIENT 165D TO 215 D; ORIENT 255D TO 305 D; ORIENT 345D TO 359 D									
	(Tile Visit 01) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN									
<b>Diagnosics</b>										
<b>Patterns</b>	<b>#</b>	<b>Primary Pattern</b>	<b>Secondary Pattern</b>	<b>Exposures</b>						
	(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1), (2)					
<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)	SPT-CLJ2043-5035	RA: 20 43 18.8160 (310.8284000d) Dec: -50 35 37.68 (-50.59380d) Equinox: J2000		V=26	Reference Frame: ICRS				
<i>Comments: Extended=YES</i>										
<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 (Total)/[Actual Dur.]</b>	<b>Orbit</b>
	1		(1) SPT-CLJ2043-5035	ACS/WFC, ACCUM, WFCENTER	F606W		POS TARG -95.127 75314833736,-104.9 8760405164263; LOW-SKY	Pattern 1, Exps 1-1 in Tile Visit 01 (1)	483 Secs (1932 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]
	2		(1) SPT-CLJ2043-5035	ACS/WFC, ACCUM, WFCENTER	F814W		POS TARG -95.127 75314833736,-104.9 8760405164263; LOW-SKY	Pattern 1, Exps 2-2 in Tile Visit 01 (1)	490 Secs (1960 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[2]



Proposal 14352 - Tile Visit 02 - Deep X-ray Observations of 3 exceptional high-z clusters of galaxies

Wed Sep 23 01:16:40 GMT 2015

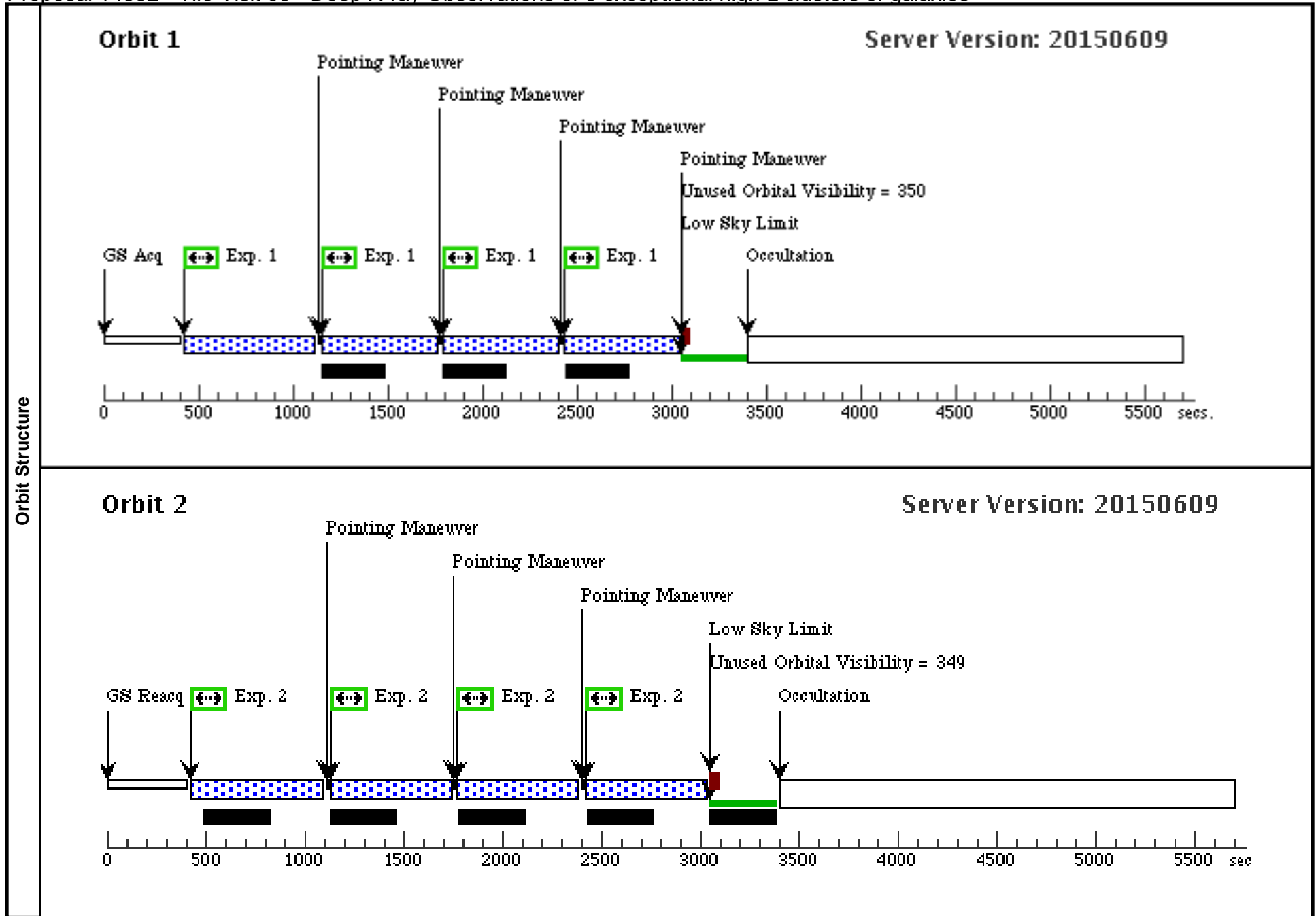
<b>Visit</b>	<b>Proposal 14352, Tile Visit 02</b> <b>Diagnostic Status: Warning</b> Scientific Instruments: ACS/WFC Special Requirements: SAME ORIENT AS 01									
	(Tile Visit 02) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN									
<b>Diagnosics</b>										
<b>Patterns</b>	<b>#</b>	<b>Primary Pattern</b>	<b>Secondary Pattern</b>	<b>Exposures</b>						
	(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1), (2)					
<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)	SPT-CLJ2043-5035	RA: 20 43 18.8160 (310.8284000d) Dec: -50 35 37.68 (-50.59380d) Equinox: J2000		V=26	Reference Frame: ICRS				
<i>Comments: Extended=YES</i>										
<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 (Total)/[Actual Dur.]</b>	<b>Orbit</b>
	1	(1) SPT-CLJ2043-5035	(1) SPT-CLJ2043-5035	ACS/WFC, ACCUM, WFCENTER	F606W		POS TARG 96.8430 3038567852,-91.563 69917281116; LOW-SKY	Pattern 1, Exps 1-1 in Tile Visit 02 (1)	483 Secs (1932 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]
	2	(1) SPT-CLJ2043-5035	(1) SPT-CLJ2043-5035	ACS/WFC, ACCUM, WFCENTER	F814W		POS TARG 96.8430 3038567852,-91.563 69917281116; LOW-SKY	Pattern 1, Exps 2-2 in Tile Visit 02 (1)	490 Secs (1960 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[2]



Proposal 14352 - Tile Visit 03 - Deep X-ray Observations of 3 exceptional high-z clusters of galaxies

Wed Sep 23 01:16:41 GMT 2015

<b>Visit</b>	<b>Proposal 14352, Tile Visit 03</b> <b>Diagnostic Status: Warning</b> Scientific Instruments: ACS/WFC Special Requirements: SAME ORIENT AS 01									
	(Tile Visit 03) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN									
<b>Diagnosics</b>										
<b>Patterns</b>	<b>#</b>	<b>Primary Pattern</b>	<b>Secondary Pattern</b>	<b>Exposures</b>						
	(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1), (2)					
<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)	SPT-CLJ2043-5035	RA: 20 43 18.8160 (310.8284000d) Dec: -50 35 37.68 (-50.59380d) Equinox: J2000		V=26	Reference Frame: ICRS				
<i>Comments: Extended=YES</i>										
<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 (Total)/[Actual Dur.]</b>	<b>Orbit</b>
	1	(1) SPT-CLJ2043-5035	(1) SPT-CLJ2043-5035	ACS/WFC, ACCUM, WFCENTER	F606W		POS TARG -96.843 03038567852,91.563 69917281116; LOW-SKY	Pattern 1, Exps 1-1 in Tile Visit 03 (1)	483 Secs (1932 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]
	2	(1) SPT-CLJ2043-5035	(1) SPT-CLJ2043-5035	ACS/WFC, ACCUM, WFCENTER	F814W		POS TARG -96.843 03038567852,91.563 69917281116; LOW-SKY	Pattern 1, Exps 2-2 in Tile Visit 03 (1)	490 Secs (1960 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[2]



Proposal 14352 - Tile Visit 04 - Deep X-ray Observations of 3 exceptional high-z clusters of galaxies

Wed Sep 23 01:16:41 GMT 2015

<b>Visit</b>	<b>Proposal 14352, Tile Visit 04</b> <b>Diagnostic Status: Warning</b> Scientific Instruments: ACS/WFC Special Requirements: SAME ORIENT AS 01									
	(Tile Visit 04) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN									
<b>Diagnosics</b>										
<b>Patterns</b>	<b>#</b>	<b>Primary Pattern</b>	<b>Secondary Pattern</b>	<b>Exposures</b>						
	(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.67 Angle Between Sides=69.05 Center Pattern=false		(1), (2)					
<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)	SPT-CLJ2043-5035	RA: 20 43 18.8160 (310.8284000d) Dec: -50 35 37.68 (-50.59380d) Equinox: J2000		V=26	Reference Frame: ICRS				
<i>Comments: Extended=YES</i>										
<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 (Total)/[Actual Dur.]</b>	<b>Orbit</b>
	1	(1) SPT-CLJ2043-5035	(1) SPT-CLJ2043-5035	ACS/WFC, ACCUM, WFCENTER	F606W		POS TARG 95.1277 5314833736,104.987 60405164263; LOW-SKY	Pattern 1, Exps 1-1 i n Tile Visit 04 (1)	483 Secs (1932 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[1]
	2	(1) SPT-CLJ2043-5035	(1) SPT-CLJ2043-5035	ACS/WFC, ACCUM, WFCENTER	F814W		POS TARG 95.1277 5314833736,104.987 60405164263; LOW-SKY	Pattern 1, Exps 2-2 i n Tile Visit 04 (1)	490 Secs (1960 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)] [==>(Pattern 4)]	[2]

