14158 - Mapping the kpc-scale Velocity Structure of Jets with HST

Cycle: 23, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) 3C403	ACS/WFC	2	01-Apr-2016 21:02:27.0	yes
02	(2) 3C66B	ACS/WFC	2	01-Apr-2016 21:02:30.0	yes
03	(3) 3C78	ACS/WFC	2	01-Apr-2016 21:02:33.0	yes
04	(4) 3C15	ACS/WFC	2	01-Apr-2016 21:02:34.0	yes
05	(5) 3C371	ACS/WFC	2	01-Apr-2016 21:02:37.0	yes
06	(6) 0521-365	ACS/WFC	2	01-Apr-2016 21:02:39.0	yes
07	(7) 4C04.77	ACS/WFC	2	01-Apr-2016 21:02:42.0	yes

14 Total Orbits Used

ABSTRACT

HST has recently broken new ground in mapping the velocity profiles of resolved, kpc-scale relativistic jets in nearby active galaxies. While we have long known that the plasma in these jets exhibit highly relativistic speeds on parsec-scales near to the black hole from radio interferometry, it was not known how the jet evolved on kpc to Mpc scales, where the jet leaves the host galaxy and begins to interact with the intergalactic medium, with implications for our understanding of jet structure and quantifying the energy carried by the jet into the external environment. Our group has developed state-of-the-art astrometry techniques to register images of nearby jets taken with HST over the last 20 years to extremely high precision, reaching accuracies on proper motions of better than 0.3 mas/year. First results from a pilot program in Cycle 21 include the dramatic finding of colliding superluminal knots in the jet of 3C264 (Meyer et al. 2015, Nature). We propose moderately deep ACS/WFC imaging of the remaining seven jets which were first observed by HST in the 1990s and which are near enough to yield proper motion accuracies of 0.3-1c. These observations will give us a reference epoch against which to register images extending back over 20 years in the HST archive. The final sample of 11 jets with high-precision kpc-scale velocity measurements will be the only sample of its kind, and will allow us for the first time to begin understanding the evolution of velocity structure on kpc scales, and the connection to jet power and morphology.

OBSERVING DESCRIPTION

We will observe 7 targets which are active galaxies with optical jets coming from the bright central core. These optical jets have previously been detected with HST, and the current observations are looking for changes (i.e., proper motions) in the jet. For all targets the observation consists of 2 orbits with ACS/WFC in F606W filter. Roll angle specifications have been applied to avoid streaking from bright cores (or nearby bright objects) from over-running the fainter optical jets.

Visit

Proposal 14158, 3c403 (01), completed Sat Apr 02 01:02:44 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: ORIENT 15D TO 35 D; ORIENT 115D TO 130 D; ORIENT 185D TO 200 D; ORIENT 290D TO 305 D

Comments: Note: the brightest knot in the jet has been detected at 1e-4 Jy, which is extremely bright for an optical knot. To avoid any risk of saturation, we have kept the exposures to ~ 400 seconds or less.

The jet is very long, approximagely 1' just on the western side. There is also a hotspot about 1' to the east of the core position (the core position is the given location of the target). The target is positioned (and orient ranges specified) to ensure that both sides of the jet land on the WFC1 detector.

There is also a nearby companion galaxy at 19:52:16.66 +02:30:13.50 (Vmag=13.87). For both the bright core and this companion we avoid orient ranges where either could produce a diffraction spike which over-runs the jet.

Fixed Targets

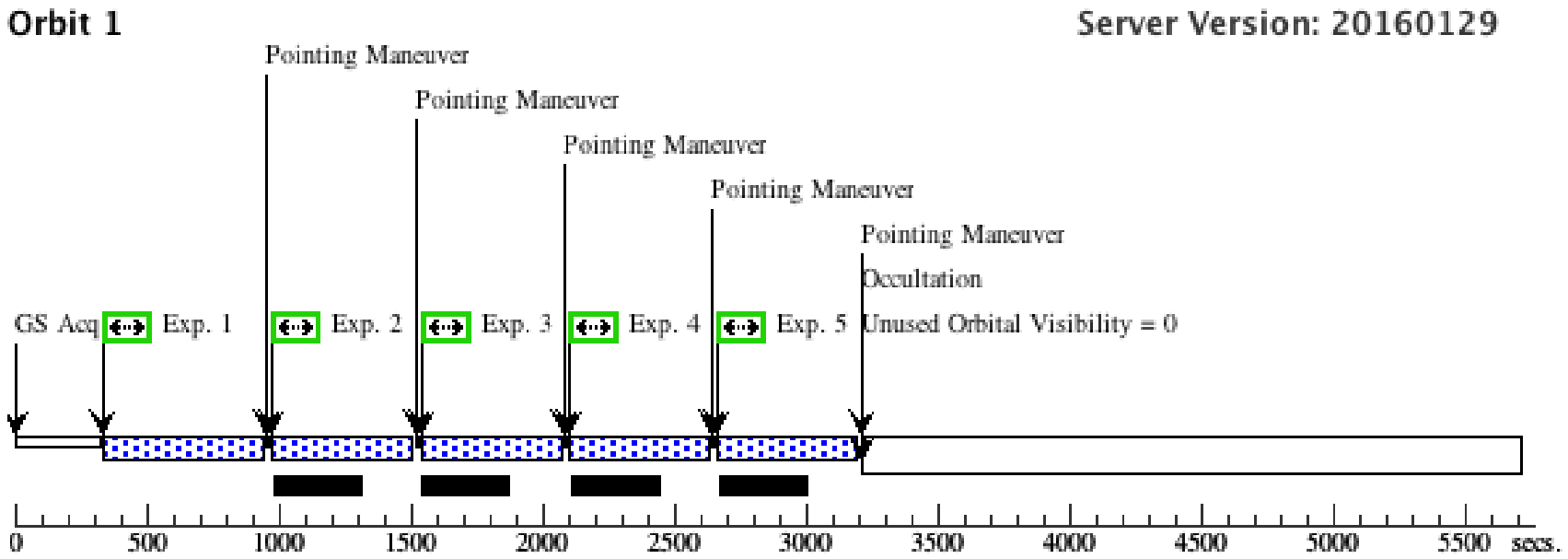
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	3C403	RA: 19 52 15.8200 (298.0659167d) Dec: +02 30 24.31 (2.50675d) Equinox: J2000		V=16.5	Reference Frame: SIMBAD

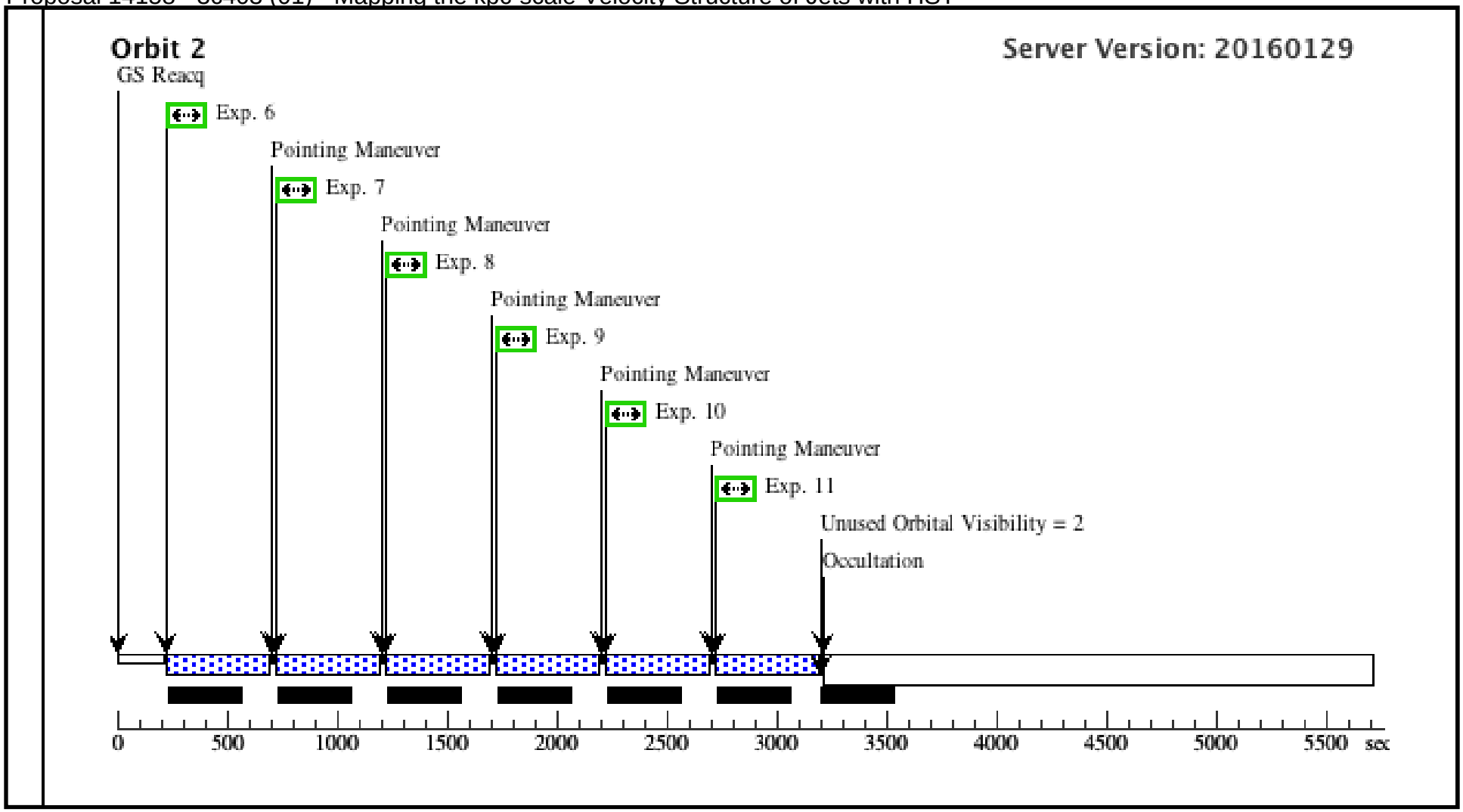
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) 3C403	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 0,0		405 Secs (405 Secs)	
								[==>]	***[1]***
2		(1) 3C403	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 0.15914, 0.23969		405 Secs (405 Secs)	
								[==>]	***[1]***
3		(1) 3C403	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 0.31641, 0.08319		405 Secs (405 Secs)	
								[==>]	***[1]***
4		(1) 3C403	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 0.07990, 0.19413		405 Secs (405 Secs)	
								[==>]	***[1]***
5		(1) 3C403	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 0.28771, 0.28896		405 Secs (405 Secs)	
								[==>]	***[1]***
6		(1) 3C403	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 0,-3		343 Secs (343 Secs)	
								[==>]	***[2]***
7		(1) 3C403	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 0.20646, -3.14754		343 Secs (343 Secs)	
								[==>]	***[2]***
8		(1) 3C403	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 0.41257, -3.24554		343 Secs (343 Secs)	
								[==>]	***[2]***
9		(1) 3C403	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 0.12505, -3.34768		343 Secs (343 Secs)	
								[==>]	***[2]***
10		(1) 3C403	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 0.33111, -3.42753		343 Secs (343 Secs)	
								[==>]	***[2]***
11		(1) 3C403	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 0.53746, -3.56020		343 Secs (343 Secs)	
								[==>]	***[2]***

Orbit Structure

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Server Version: 20160129
GS Reacq
Exp. 6
Pointing Maneuver
Exp. 7
Pointing Maneuver
Exp. 8
Pointing Maneuver
Exp. 9
Pointing Maneuver
Exp. 10
Pointing Maneuver
Exp. 11
Unused Orbital Visibility = 2
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 14158, 3c66B (02), scheduling Sat Apr 02 01:02:44 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: ORIENT 0D TO 30 D; ORIENT 90D TO 115 D; ORIENT 180D TO 205 D

Comments: The appearance of the target in the optical is mainly dominated by the host elliptical galaxy which is moderately bright (Vmag=15). The jet itself runs to the northwest (PA approx 45 deg N->W) and is about 10" arcseconds long.

The main difficulties for the observation are two very bright, somewhat nearby sources -- one about 80" directly north (Vmag=9) and one about 80" south (Vmag=11.65). The orient ranges are specified to completley avoid having the brighter source on the WFC1 detector (where our target lies). In addition, we avoid roll angles where either the core of the host galaxy for our jet OR the Vmag=11.65 source to the south could possibly produce saturation spikes which would overrun the jet. We also avoid angles where bright sources would land at the edge of the detectors.

Overall the field is crowded with bright sources, so we have opted for relatively short exposures (~ 400 seconds).

Fixed Targets

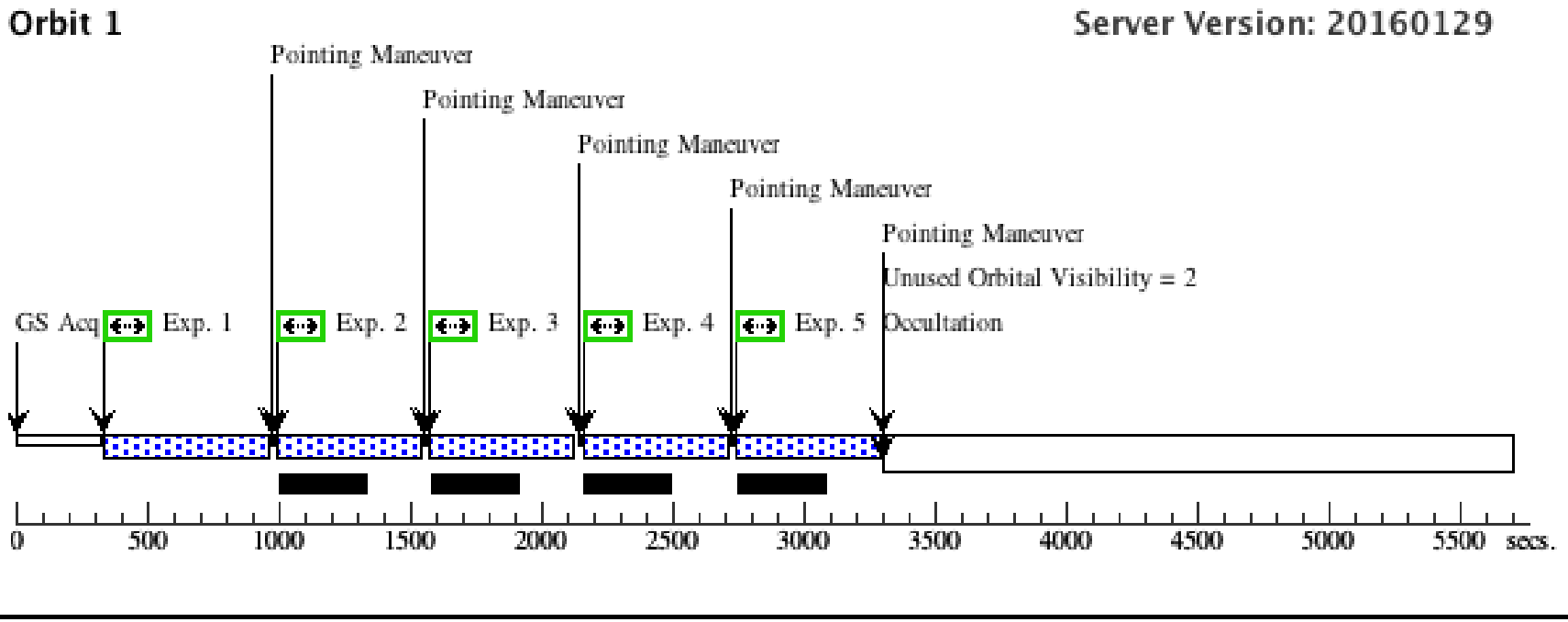
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	3C66B	RA: 02 23 11.4112 (35.7975467d) Dec: +42 59 31.38 (42.99205d) Equinox: J2000		V=14.81	Reference Frame: SIMBAD

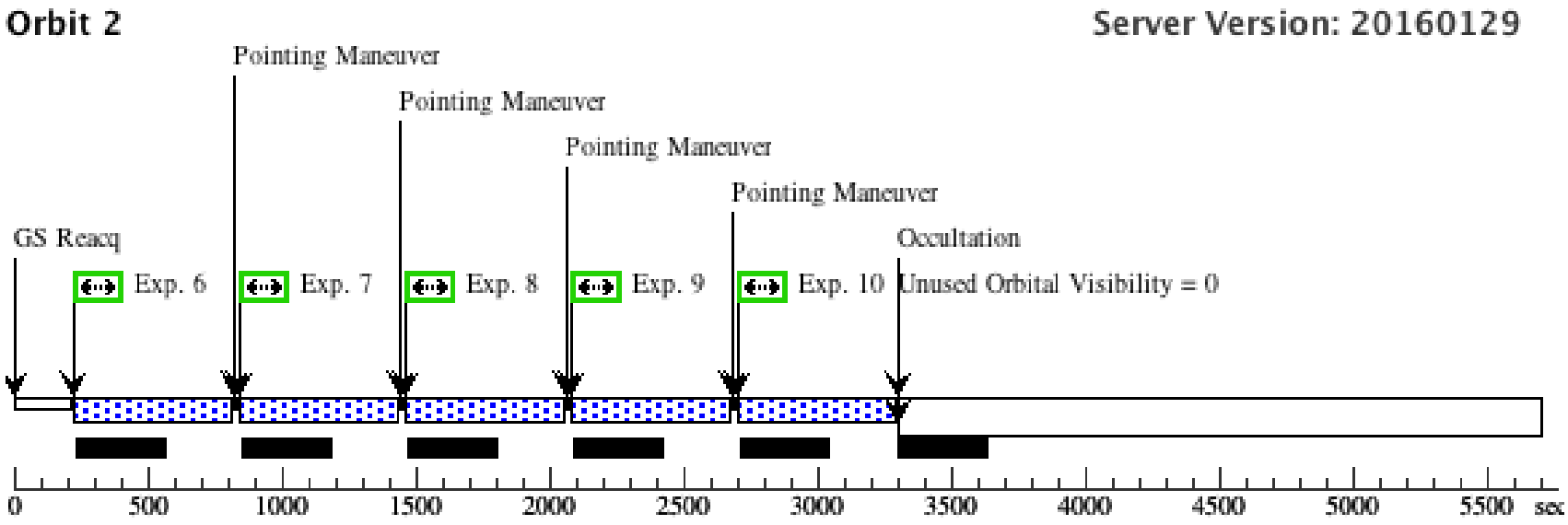
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(2) 3C66B	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50,50		424 Secs (424 Secs)	
								[==>]	***[1]***
2		(2) 3C66B	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.20646,50.14754		424 Secs (424 Secs)	
								[==>]	***[1]***
3		(2) 3C66B	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.41257,50.24554		424 Secs (424 Secs)	
								[==>]	***[1]***
4		(2) 3C66B	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.12505,50.34768		424 Secs (424 Secs)	
								[==>]	***[1]***
5		(2) 3C66B	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.33111,50.42753		424 Secs (424 Secs)	
								[==>]	***[1]***
6		(2) 3C66B	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50,53		463 Secs (463 Secs)	
								[==>]	***[2]***
7		(2) 3C66B	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.20646,53.14754		463 Secs (463 Secs)	
								[==>]	***[2]***
8		(2) 3C66B	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.41257,53.24554		463 Secs (463 Secs)	
								[==>]	***[2]***
9		(2) 3C66B	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.12505,53.34768		463 Secs (463 Secs)	
								[==>]	***[2]***
10		(2) 3C66B	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.33111,53.42753		463 Secs (463 Secs)	
								[==>]	***[2]***

Orbit Structure





Visit

Proposal 14158, 3c78 (03), implementation Sat Apr 02 01:02:44 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: ORIENT 340D TO 10 D; ORIENT 80D TO 105 D; ORIENT 165D TO 195 D; ORIENT 245D TO 280 D

Comments: The target is an optical jet hosted by a Vmag=13.8 elliptical galaxy. The field is relatively empty with no major nearby bright sources to require any special considerations. Orent constraints are specified to ensure that the bright core of the galaxy does not produce any saturation spikes which could over run the jet.

POS TARGS are used to place the target near the readout of the WFC1 detector to minimize CTE effects.

Fixed Targets

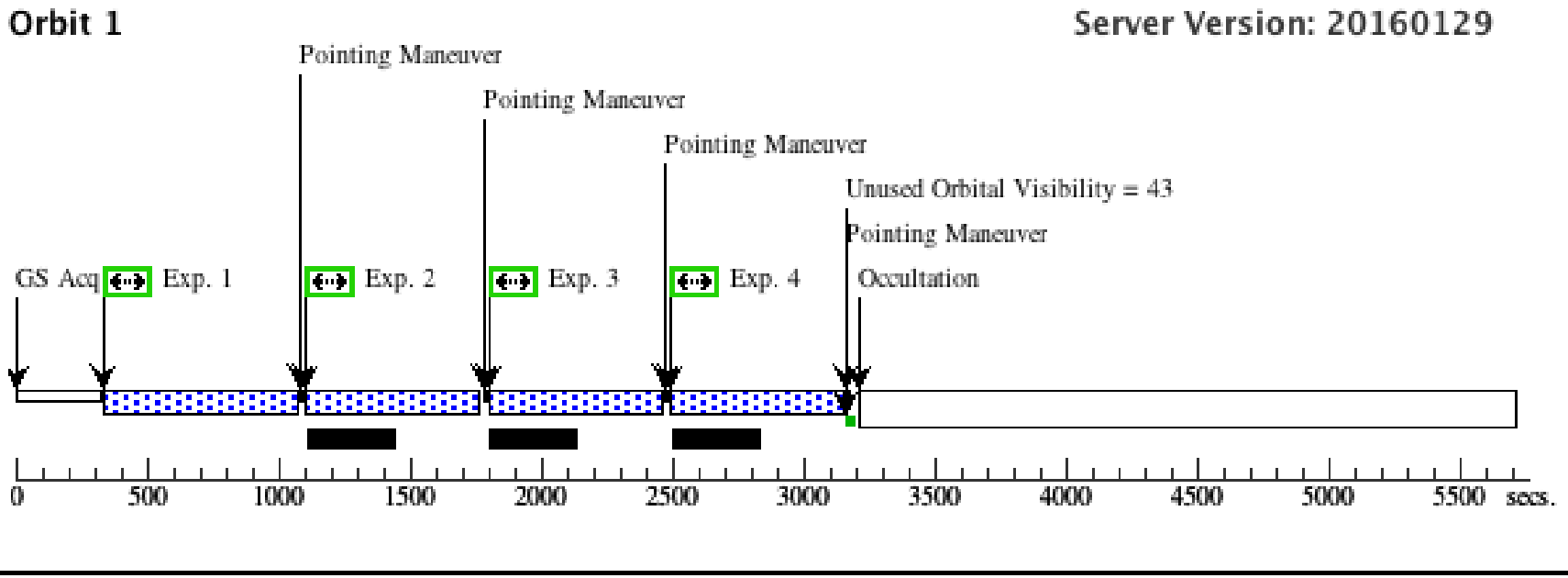
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	3C78	RA: 03 08 26.2238 (47.1092658d) Dec: +04 06 39.30 (4.11092d) Equinox: J2000		V=13.8	Reference Frame: SIMBAD

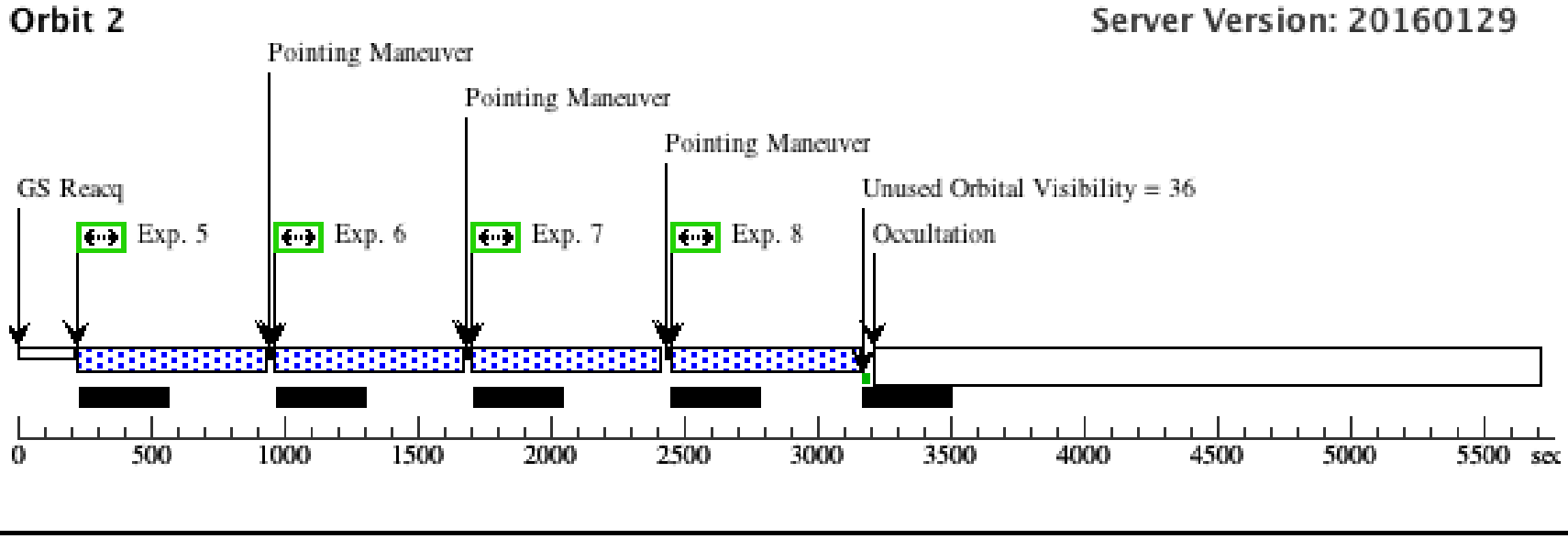
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(3) 3C78	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50,50		535 Secs (535 Secs) *[==>]*	***[1]***
2		(3) 3C78	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.1740, 50.2350		535 Secs (535 Secs) *[==>]*	***[1]***
3		(3) 3C78	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.3232, 50.1235		535 Secs (535 Secs) *[==>]*	***[1]***
4		(3) 3C78	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.1005, 50.3305		535 Secs (535 Secs) *[==>]*	***[1]***
5		(3) 3C78	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.5075, 53.0505		585 Secs (585 Secs) *[==>]*	***[2]***
6		(3) 3C78	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.6815, 53.2855		585 Secs (585 Secs) *[==>]*	***[2]***
7		(3) 3C78	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.8300, 53.1735		585 Secs (585 Secs) *[==>]*	***[2]***
8		(3) 3C78	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.6080, 53.3810		585 Secs (585 Secs) *[==>]*	***[2]***

Orbit Structure





Visit

Proposal 14158, 3c15 (04), completed Sat Apr 02 01:02:44 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: ORIENT 5D TO 40 D; ORIENT 180D TO 215 D; ORIENT 275D TO 305 D; ORIENT 80D TO 115 D

Comments: 3C 15 is an optical jet hosted by an elliptical galaxy. We have used orient constraints to ensure no diffraction spikes from the core and another nearby bright source overrun the jet.

Fixed Targets

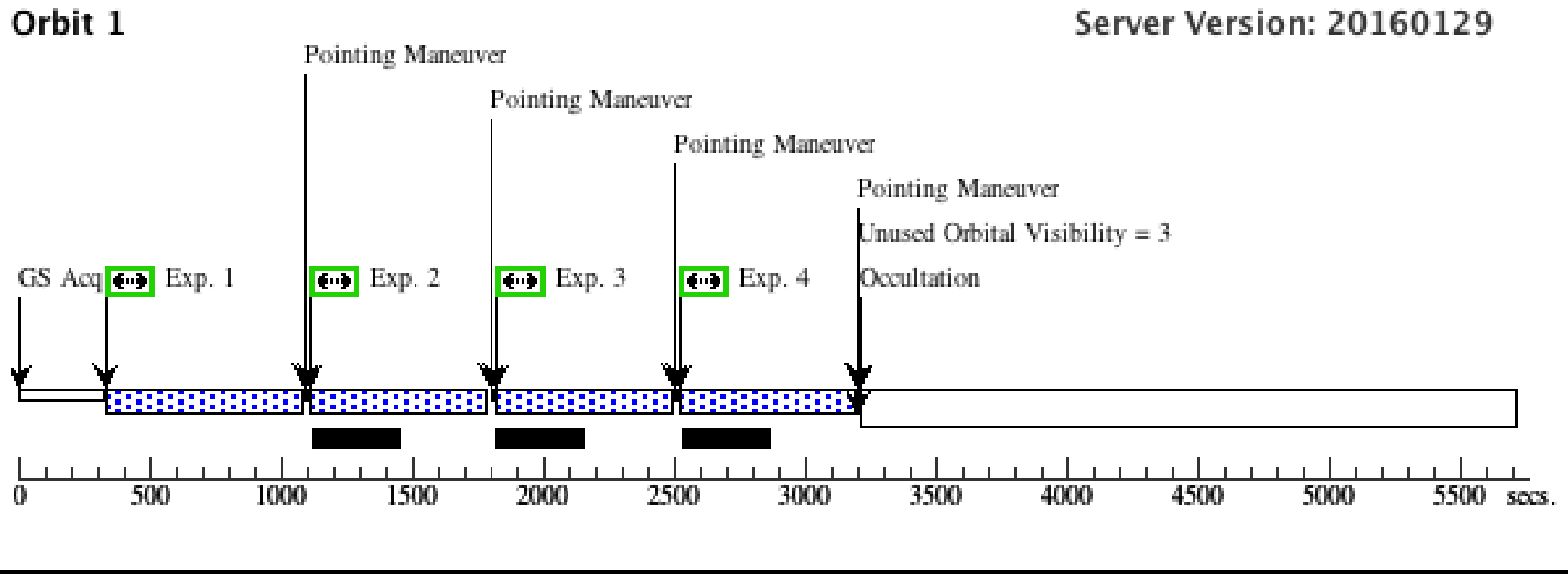
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(4)	3C15	RA: 00 37 4.0960 (9.2670667d) Dec: -01 09 8.20 (-1.15228d) Equinox: J2000		V=16	Reference Frame: SIMBAD

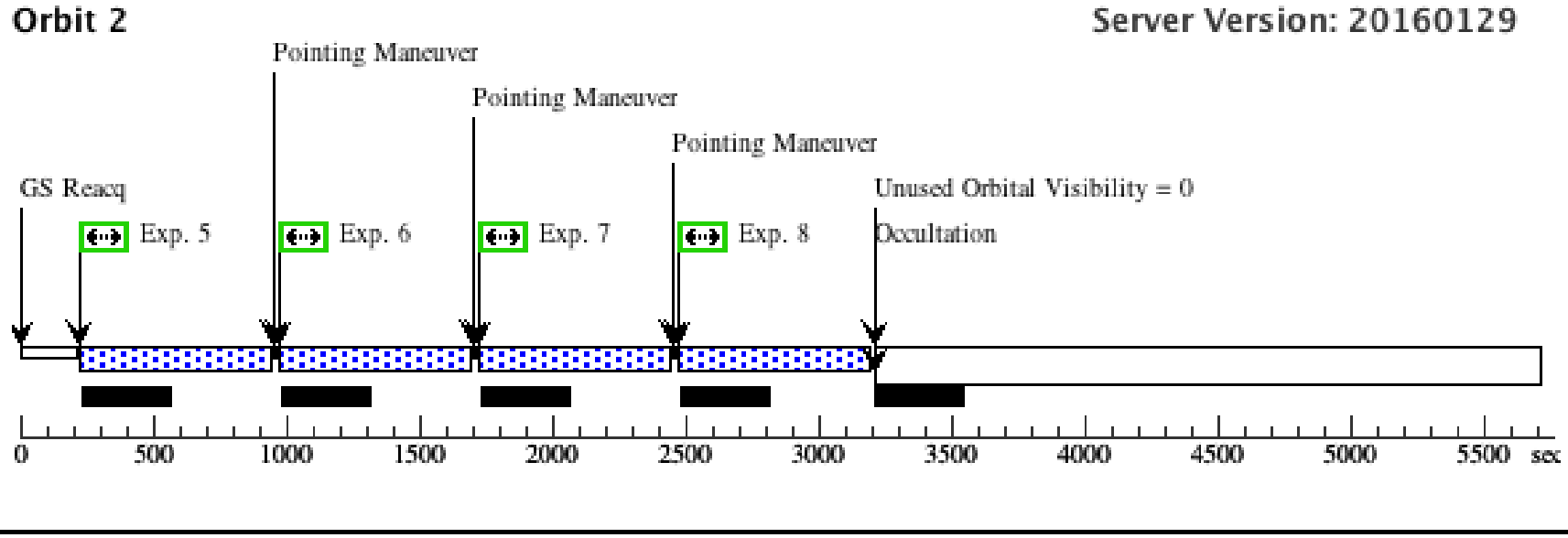
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(4) 3C15	ACS/WFC, ACCUM, WFC	F606W		POS TARG 30,20; GS ACQ SCENARIO BASE1B3		545 Secs (545 Secs) *[==>]*	 ***[1]***
2		(4) 3C15	ACS/WFC, ACCUM, WFC	F606W		POS TARG 30.1740, 20.1850		545 Secs (545 Secs) *[==>]*	 ***[1]***
3		(4) 3C15	ACS/WFC, ACCUM, WFC	F606W		POS TARG 30.3232, 20.1235		545 Secs (545 Secs) *[==>]*	 ***[1]***
4		(4) 3C15	ACS/WFC, ACCUM, WFC	F606W		POS TARG 30.1005, 20.3305		545 Secs (545 Secs) *[==>]*	 ***[1]***
5		(4) 3C15	ACS/WFC, ACCUM, WFC	F606W		POS TARG 30.5075, 23.0505		594 Secs (594 Secs) *[==>]*	 ***[2]***
6		(4) 3C15	ACS/WFC, ACCUM, WFC	F606W		POS TARG 30.6815, 23.2855		594 Secs (594 Secs) *[==>]*	 ***[2]***
7		(4) 3C15	ACS/WFC, ACCUM, WFC	F606W		POS TARG 30.8300, 23.1735		594 Secs (594 Secs) *[==>]*	 ***[2]***
8		(4) 3C15	ACS/WFC, ACCUM, WFC	F606W		POS TARG 30.6080, 23.3810		594 Secs (594 Secs) *[==>]*	 ***[2]***

Orbit Structure





Visit

Proposal 14158, 3c371 (05), completed Sat Apr 02 01:02:44 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: ORIENT 0D TO 30 D; ORIENT 90D TO 110 D; ORIENT 180D TO 210 D; ORIENT 270D TO 290 D

Comments: The target is an optical jet pointed towards the southwest, approximately 6 arcseconds long. The host galaxy and central nucleus are very bright (V-mag 12), so we have opted for relatively short exposures ~400 seconds. Orient constraints are specified to avoid the bright core from producing diffraction spikes over the jet. POS TARGS are used both for dithering and to place the target near to the WFC1 readouts to lessen CTE.

Fixed Targets

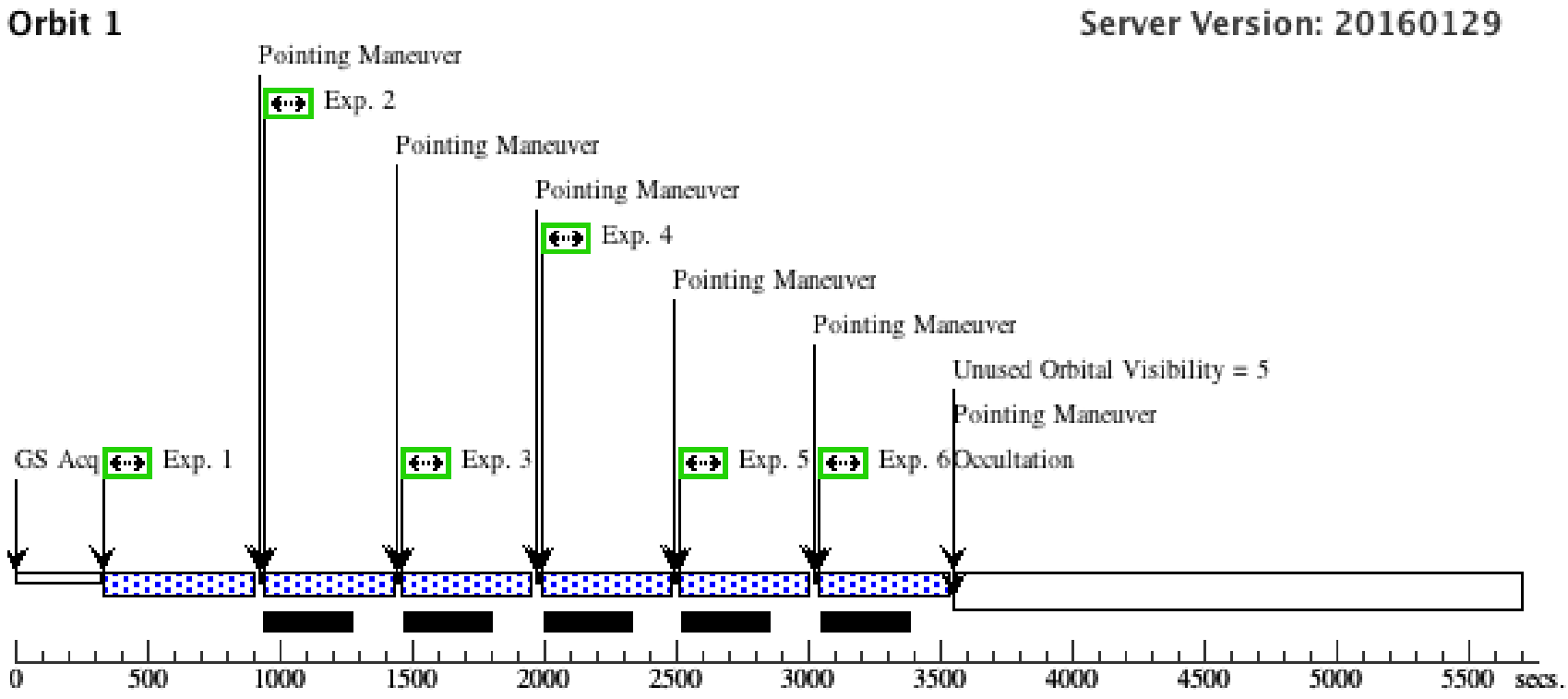
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(5)	3C371	RA: 18 06 50.6807 (271.7111696d) Dec: +69 49 28.11 (69.82447d) Equinox: J2000		V=14.22	Reference Frame: SIMBAD

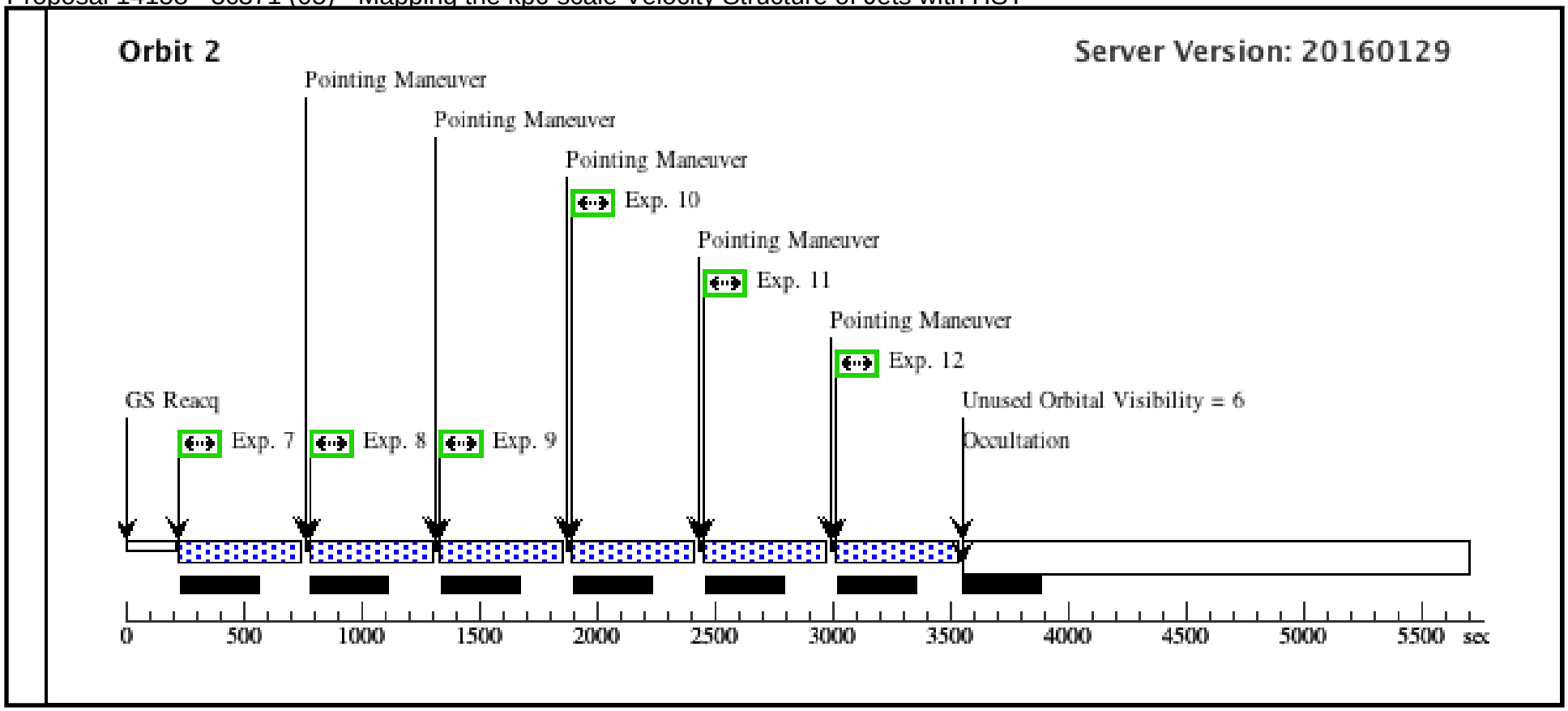
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(5) 3C371	ACS/WFC, ACCUM, WFC	F606W		POS TARG 60,60		368 Secs (368 Secs)	
								[==>]	***[1]***
2		(5) 3C371	ACS/WFC, ACCUM, WFC	F606W		POS TARG 60.1740, 60.1850		368 Secs (368 Secs)	
								[==>]	***[1]***
3		(5) 3C371	ACS/WFC, ACCUM, WFC	F606W		POS TARG 60.3232, 60.1325		368 Secs (368 Secs)	
								[==>]	***[1]***
4		(5) 3C371	ACS/WFC, ACCUM, WFC	F606W		POS TARG 60.1005, 60.3305		368 Secs (368 Secs)	
								[==>]	***[1]***
5		(5) 3C371	ACS/WFC, ACCUM, WFC	F606W		POS TARG 60.5030, 60.0460		368 Secs (368 Secs)	
								[==>]	***[1]***
6		(5) 3C371	ACS/WFC, ACCUM, WFC	F606W		POS TARG 60.6770, 60.2310		368 Secs (368 Secs)	
								[==>]	***[1]***
7		(5) 3C371	ACS/WFC, ACCUM, WFC	F606W		POS TARG 60.8262, 63.1695		400 Secs (400 Secs)	
								[==>]	***[2]***
8		(5) 3C371	ACS/WFC, ACCUM, WFC	F606W		POS TARG 60.6035, 63.3765		400 Secs (400 Secs)	
								[==>]	***[2]***
9		(5) 3C371	ACS/WFC, ACCUM, WFC	F606W		POS TARG 60.1180, 63.5180		400 Secs (400 Secs)	
								[==>]	***[2]***
10		(5) 3C371	ACS/WFC, ACCUM, WFC	F606W		POS TARG 60.2920, 63.7030		400 Secs (400 Secs)	
								[==>]	***[2]***
11		(5) 3C371	ACS/WFC, ACCUM, WFC	F606W		POS TARG 60.4412, 63.6415		400 Secs (400 Secs)	
								[==>]	***[2]***
12		(5) 3C371	ACS/WFC, ACCUM, WFC	F606W		POS TARG 60.2185, 63.8485		400 Secs (400 Secs)	
								[==>]	***[2]***

Orbit Structure




Orbit 2
Server Version: 20160129
Pointing Maneuver
Pointing Maneuver
Pointing Maneuver
Exp. 10
Pointing Maneuver
Exp. 11
Pointing Maneuver
Exp. 12
GS Reacq
Exp. 7
Exp. 8
Exp. 9
Unused Orbital Visibility = 6
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 14158, pks0521-365 (06), completed Sat Apr 02 01:02:44 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: ORIENT 350D TO 10 D; ORIENT 75D TO 90 D; ORIENT 235D TO 275 D

Comments: Another optical jet, approximately 45 degrees south of west. The host elliptical has a bright core - Vmag = 12. We have thus adopted relatively short exposures, and orient constraints to avoid diffraction spikes over the jet.

Fixed Targets

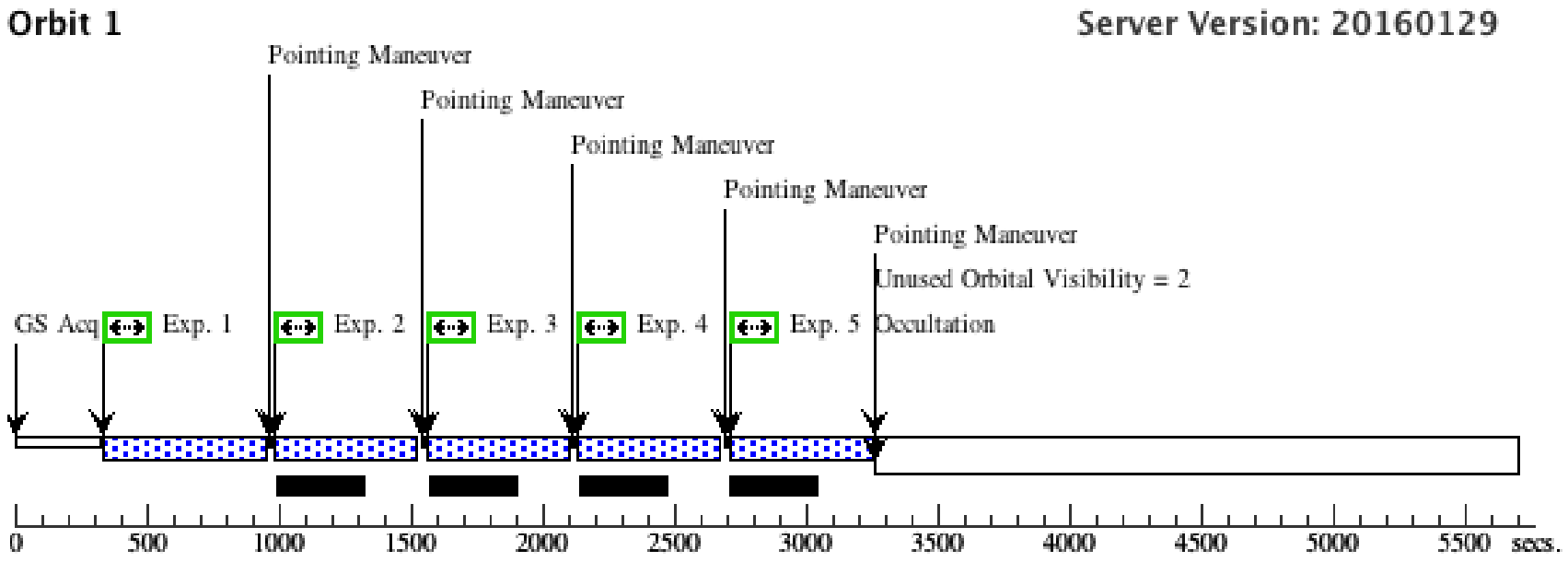
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(6)	0521-365	RA: 05 22 57.9846 (80.7416025d) Dec: -36 27 30.85 (-36.45857d) Equinox: J2000		V=14.62	Reference Frame: SIMBAD

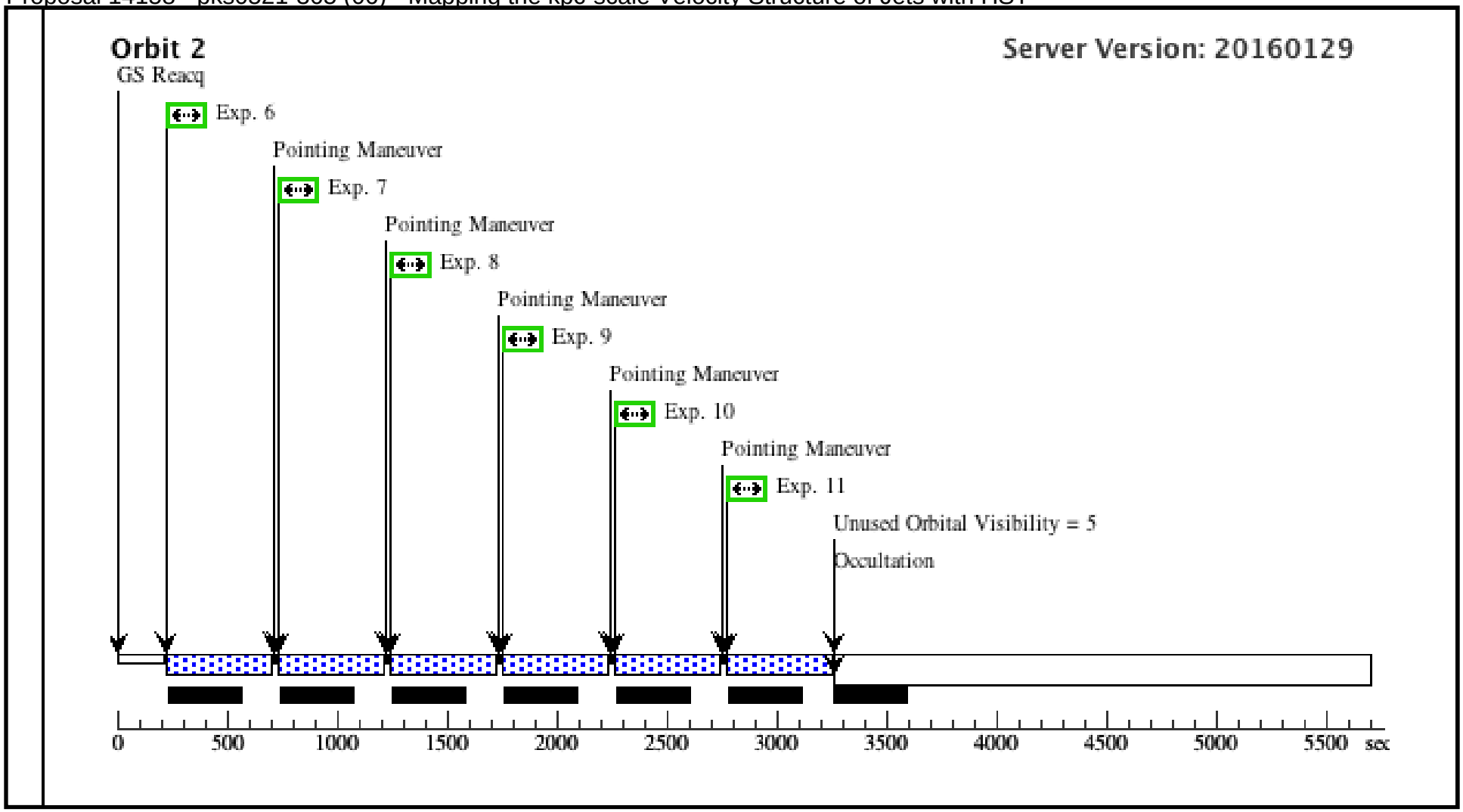
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(6) 0521-365	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50,40		416 Secs (416 Secs)	
								[==>]	***[1]***
2		(6) 0521-365	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.1591 4,40.23969		416 Secs (416 Secs)	
								[==>]	***[1]***
3		(6) 0521-365	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.3164 1,40.08319		416 Secs (416 Secs)	
								[==>]	***[1]***
4		(6) 0521-365	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.0799 0,40.19413		416 Secs (416 Secs)	
								[==>]	***[1]***
5		(6) 0521-365	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.2877 1,40.28896		416 Secs (416 Secs)	
								[==>]	***[1]***
6		(6) 0521-365	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50,43		352 Secs (352 Secs)	
								[==>]	***[2]***
7		(6) 0521-365	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.2064 6,43.14754		352 Secs (352 Secs)	
								[==>]	***[2]***
8		(6) 0521-365	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.4125 7,43.24554		352 Secs (352 Secs)	
								[==>]	***[2]***
9		(6) 0521-365	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.1250 5,43.34768		352 Secs (352 Secs)	
								[==>]	***[2]***
10		(6) 0521-365	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.3311 1,43.42753		352 Secs (352 Secs)	
								[==>]	***[2]***
11		(6) 0521-365	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.5374 6,43.56020		352 Secs (352 Secs)	
								[==>]	***[2]***

Orbit Structure




Orbit 2
Server Version: 20160129
GS Reacq
Exp. 6
Pointing Maneuver
Exp. 7
Pointing Maneuver
Exp. 8
Pointing Maneuver
Exp. 9
Pointing Maneuver
Exp. 10
Pointing Maneuver
Exp. 11
Unused Orbital Visibility = 5
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 14158, 4c04.77 (07), completed Sat Apr 02 01:02:44 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: ORIENT 50D TO 95 D; ORIENT 150D TO 180 D; ORIENT 230D TO 275 D

Comments: The target is an optical jet, of 2-3" length pointed in the northwest direction. The host galaxy is an elliptical with a bright core. We have used orient constraints to avoid having the diffraction spikes run over the jet, also taking into account other nearby bright sources. POS TARGS are used for dithering and to put the target closer to the WFC1 readouts for improved CTE.

Fixed Targets

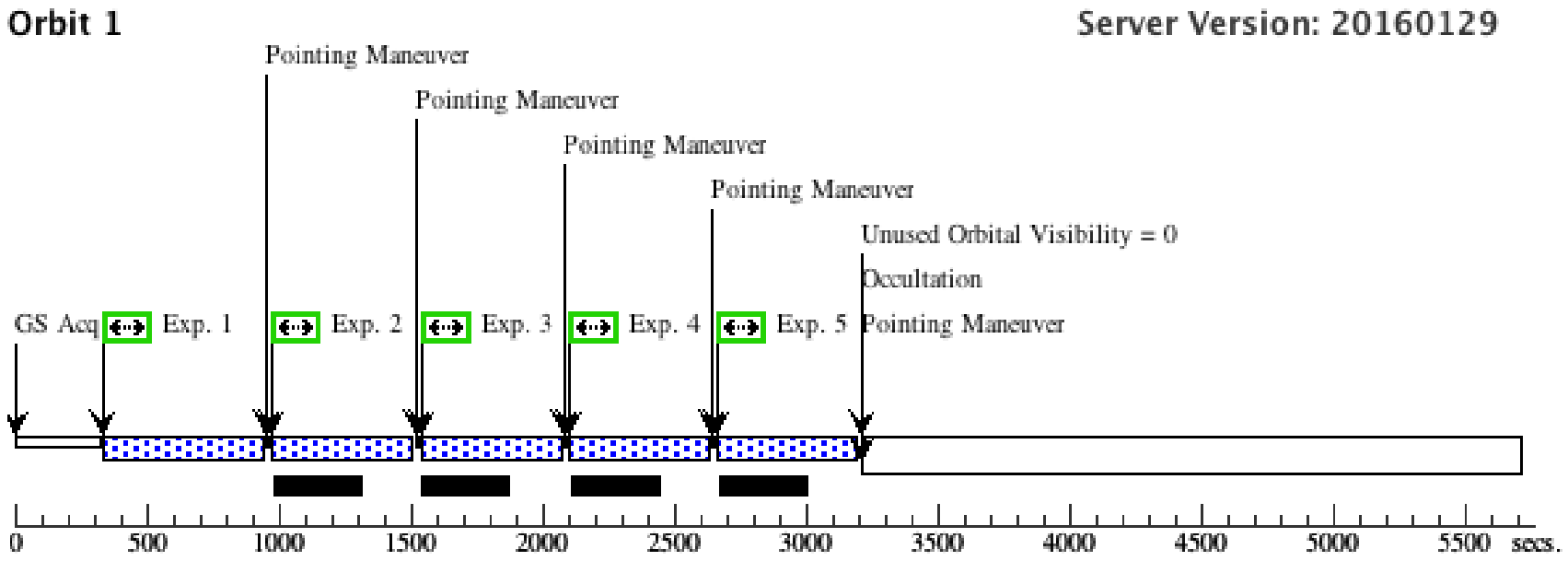
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(7)	4C04.77	RA: 22 04 17.6522 (331.0735508d) Dec: +04 40 2.01 (4.66723d) Equinox: J2000		V=15.2	Reference Frame: SIMBAD

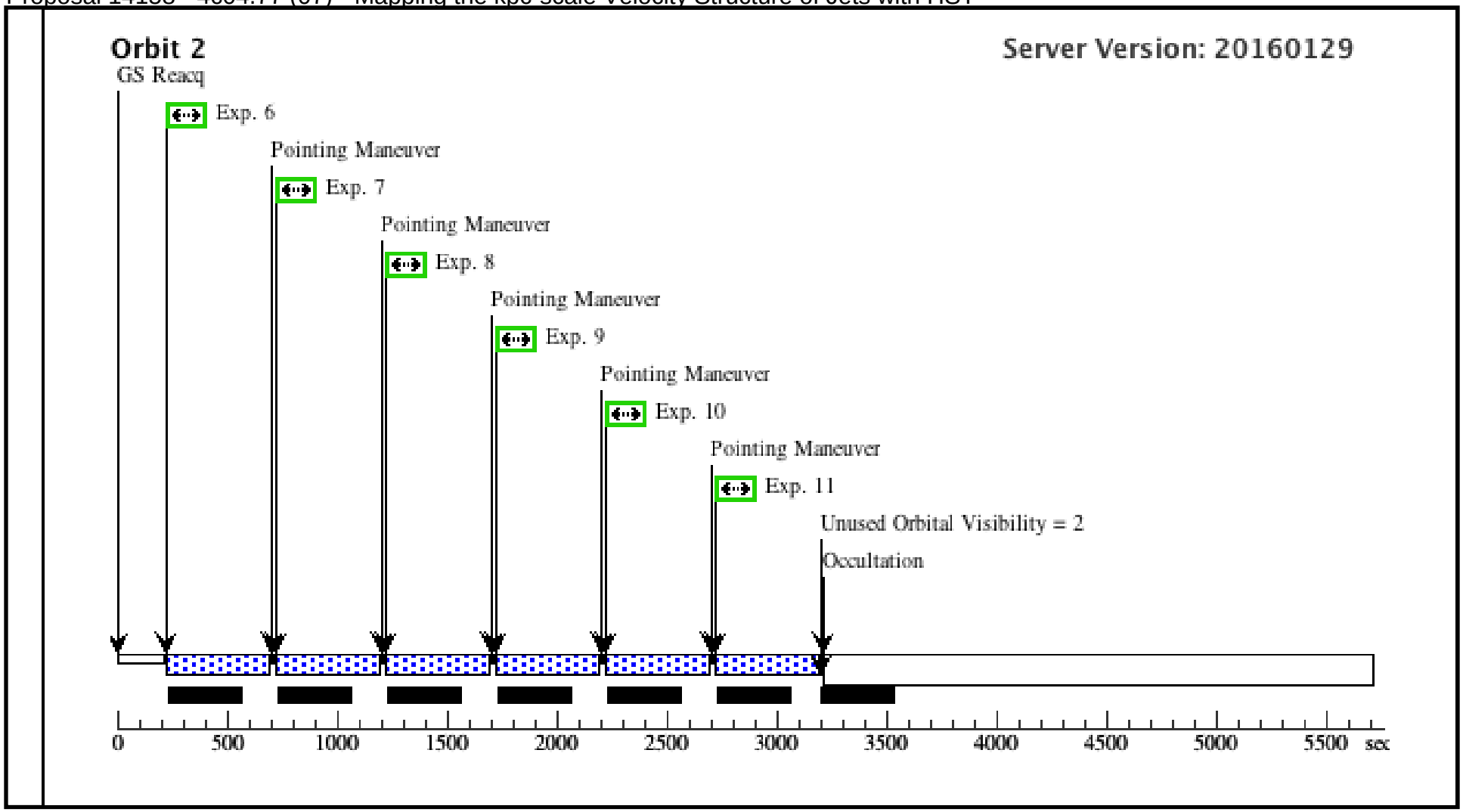
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(7) 4C04.77	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50,50		405 Secs (405 Secs)	
								[==>]	***[1]***
2		(7) 4C04.77	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.1591 4,50.23969		405 Secs (405 Secs)	
								[==>]	***[1]***
3		(7) 4C04.77	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.3164 1,50.08329		405 Secs (405 Secs)	
								[==>]	***[1]***
4		(7) 4C04.77	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.0799 0,50.19413		405 Secs (405 Secs)	
								[==>]	***[1]***
5		(7) 4C04.77	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.2877 1,50.28896		405 Secs (405 Secs)	
								[==>]	***[1]***
6		(7) 4C04.77	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50,53		343 Secs (343 Secs)	
								[==>]	***[2]***
7		(7) 4C04.77	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.2064 6,53.14754		343 Secs (343 Secs)	
								[==>]	***[2]***
8		(7) 4C04.77	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.4125 7,53.24554		343 Secs (343 Secs)	
								[==>]	***[2]***
9		(7) 4C04.77	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.1250 5,53.34768		343 Secs (343 Secs)	
								[==>]	***[2]***
10		(7) 4C04.77	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.3311 1,53.42753		343 Secs (343 Secs)	
								[==>]	***[2]***
11		(7) 4C04.77	ACS/WFC, ACCUM, WFC	F606W		POS TARG 50.5374 6,53.56020		343 Secs (343 Secs)	
								[==>]	***[2]***

Orbit Structure




Orbit 2
Server Version: 20160129
GS Reacq
Exp. 6
Pointing Maneuver
Exp. 7
Pointing Maneuver
Exp. 8
Pointing Maneuver
Exp. 9
Pointing Maneuver
Exp. 10
Pointing Maneuver
Exp. 11
Unused Orbital Visibility = 2
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec