



13327 - Proper Motions at 500 Mpc: Measuring Superluminal motions in Optical Jets with HST

Cycle: 21, 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	(3) 3C273-JET	ACS/WFC	4	24-Jun-2013 22:21:48.0	yes
02	(1) 3C264-JET	ACS/WFC	2	24-Jun-2013 22:22:07.0	yes
03	(2) 3C346-JET	ACS/WFC	2	24-Jun-2013 22:22:19.0	yes

8 Total Orbits Used

ABSTRACT

Following the success of a recent archival program to measure precisely the superluminal proper motions of the relativistic jet in the nearby galaxy M87, we propose new ACS/WFC observations of three radio galaxies with optical jets previously detected by HST. The moderately deep imaging we propose will provide us with a well-sampled astrometric reference frame in order to accurately register archival HST images of these jets, using globular clusters and background galaxies to reach sub-pixel astrometric accuracy. In conjunction with archival data, the new observations will provide baselines of 20 years over which to compare the location of knots in these jets, allowing us to measure speeds for individual components with accuracies of $0.2c$ for the nearby source 3C 264 and $1c$ for 3C 346 and 3C 273. The kinematics of jets on large scales have not been previously studied, leaving open the question of whether the bright knots and compact features in the jet are standing recollimation shocks, or propagating plasma with possibly relativistic bulk motion. The latter case implies a jet that is intermittent on timescales much longer than the dynamical timescale. Observing proper motions in the optical allows us to study kinematics of compact features associated with zones of in situ particle acceleration which produce the higher-energy optical through X-ray photons, not distinctly visible in radio maps. The selected targets offer a diversity in jet power and morphological type which will allow us to better understand the AGN jet population as a whole, and put constraints on unknowns such as the jet energy content, and the impact of jets on the galaxy and cluster environment.

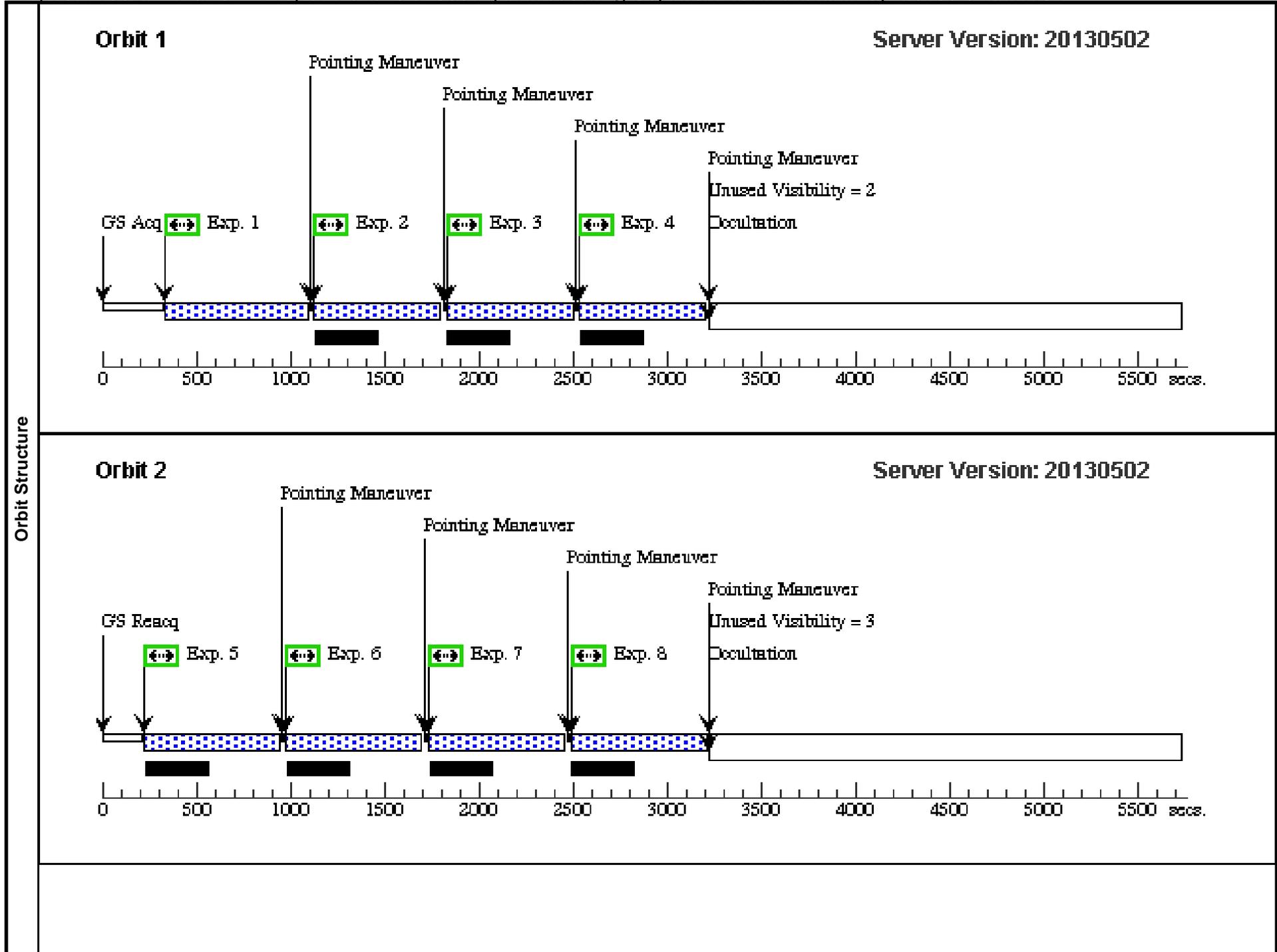
OBSERVING DESCRIPTION

We will observe each target using the ACS/WFC F606W filter and a dithering strategy that uses POS TARGs configured according to the total number of exposures. The POS TARGs have also been offset by a fixed number of pixels from the WFC1 pointing in order to put the targets closer to the readout amplifiers on WFC1, in order to reduce CTE effects. The total number of exposures is simply 4 per orbit: 16 total for 3C 273, and 8 each for 3C 264 and 3C 346, at around 500 - 600 seconds per exposure. 3C273 is roll constrained to avoid blooming and saturation from the quasar core overrunning the jet, which is the area of scientific interest. Saturation is not expected to be a problem for the other two targets. Post-flash is not used as background levels should be adequate with the proposed exposure times. (Note that these observations are NOT duplications as the goal of the project is to measure proper motions and other changes since previous epochs).

Proposal 13327 - Visit 01 - Proper Motions at 500 Mpc: Measuring Superluminal motions in Optical Jets with HST

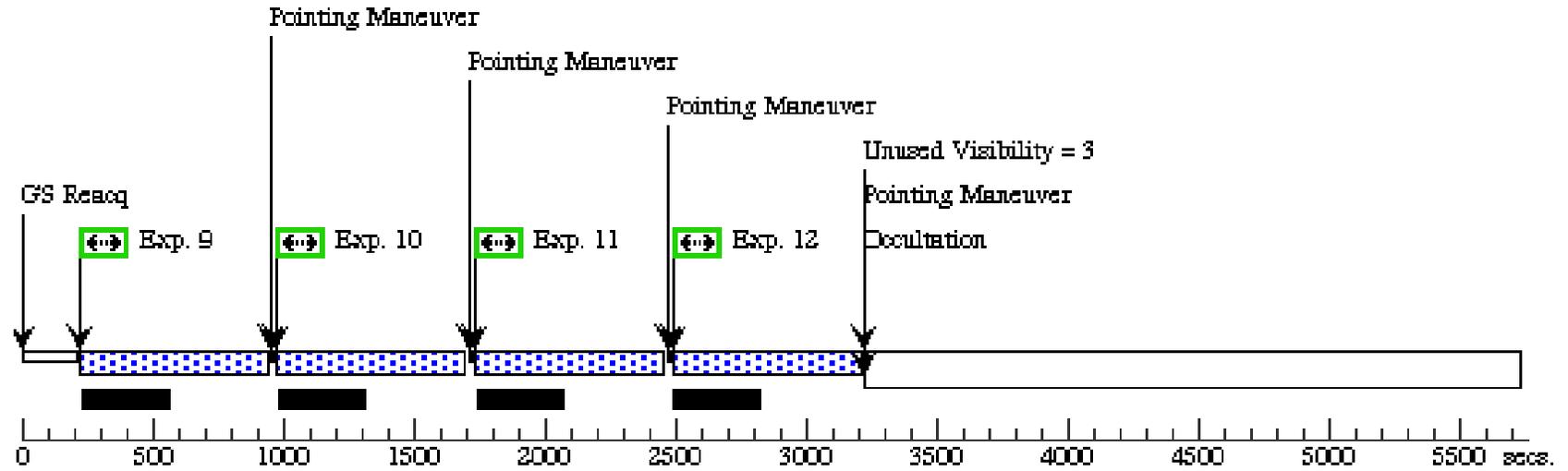
Tue Jun 25 02:22:28 GMT 2013

Fixed Targets	Visit									
	Proposal 13327, Visit 01 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: ORIENT 324.7D TO 29.7 D; ORIENT 59.7D TO 114.7 D; ORIENT 144.7D TO 209.7 D; ORIENT 239.7D TO 294.7 D									
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous					
(3)	3C273-JET	RA: 12 29 6.6951 (187.2778962d) Dec: +02 03 8.66 (2.05241d) Equinox: J2000		V=12.85	Reference Frame: SIMBAD					
<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(3)	3C273-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55,15		550 Secs (550 Secs) [=>550.0 Secs]	[1]
	2	(3)	3C273-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55.2228, 15.1158		550 Secs (550 Secs) [=>550.0 Secs]	[1]
	3	(3)	3C273-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55.0998, 15.2303		550 Secs (550 Secs) [=>550.0 Secs]	[1]
	4	(3)	3C273-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55.3225, 15.3460		550 Secs (550 Secs) [=>550.0 Secs]	[1]
	5	(3)	3C273-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55.4075, 15.0306		598 Secs (598 Secs) [=>598.0 Secs]	[2]
	6	(3)	3C273-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55.6304, 15.1464		598 Secs (598 Secs) [=>598.0 Secs]	[2]
	7	(3)	3C273-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55.5073, 15.2609		598 Secs (598 Secs) [=>598.0 Secs]	[2]
	8	(3)	3C273-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55.7302, 15.3767		598 Secs (598 Secs) [=>598.0 Secs]	[2]
	9	(3)	3C273-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55.0018, 15.4085		598 Secs (598 Secs) [=>598.0 Secs]	[3]
	10	(3)	3C273-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55.2246, 15.5243		598 Secs (598 Secs) [=>598.0 Secs]	[3]
	11	(3)	3C273-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55.1017, 15.6388		598 Secs (598 Secs) [=>598.0 Secs]	[3]
	12	(3)	3C273-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55.3244, 15.7545		598 Secs (598 Secs) [=>598.0 Secs]	[3]
	13	(3)	3C273-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55.4093, 15.4392		598 Secs (598 Secs) [=>598.0 Secs]	[4]
	14	(3)	3C273-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55.6322, 15.5550		598 Secs (598 Secs) [=>598.0 Secs]	[4]
	15	(3)	3C273-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55.5091, 15.6695		598 Secs (598 Secs) [=>598.0 Secs]	[4]
	16	(3)	3C273-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55.7320, 15.7852		598 Secs (598 Secs) [=>598.0 Secs]	[4]



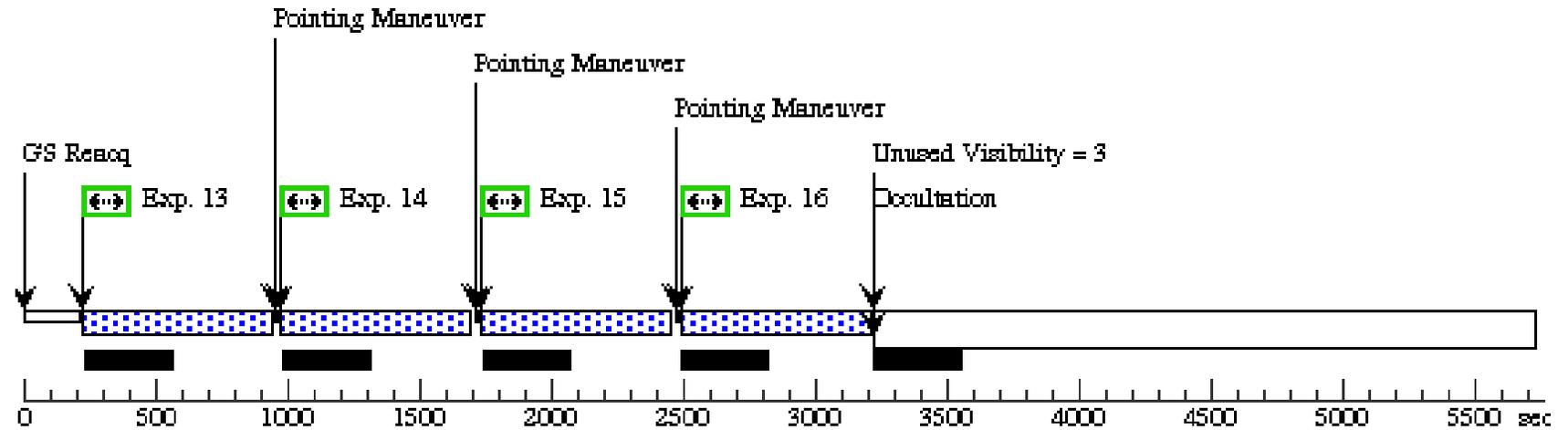
Orbit 3

Server Version: 20130502



Orbit 4

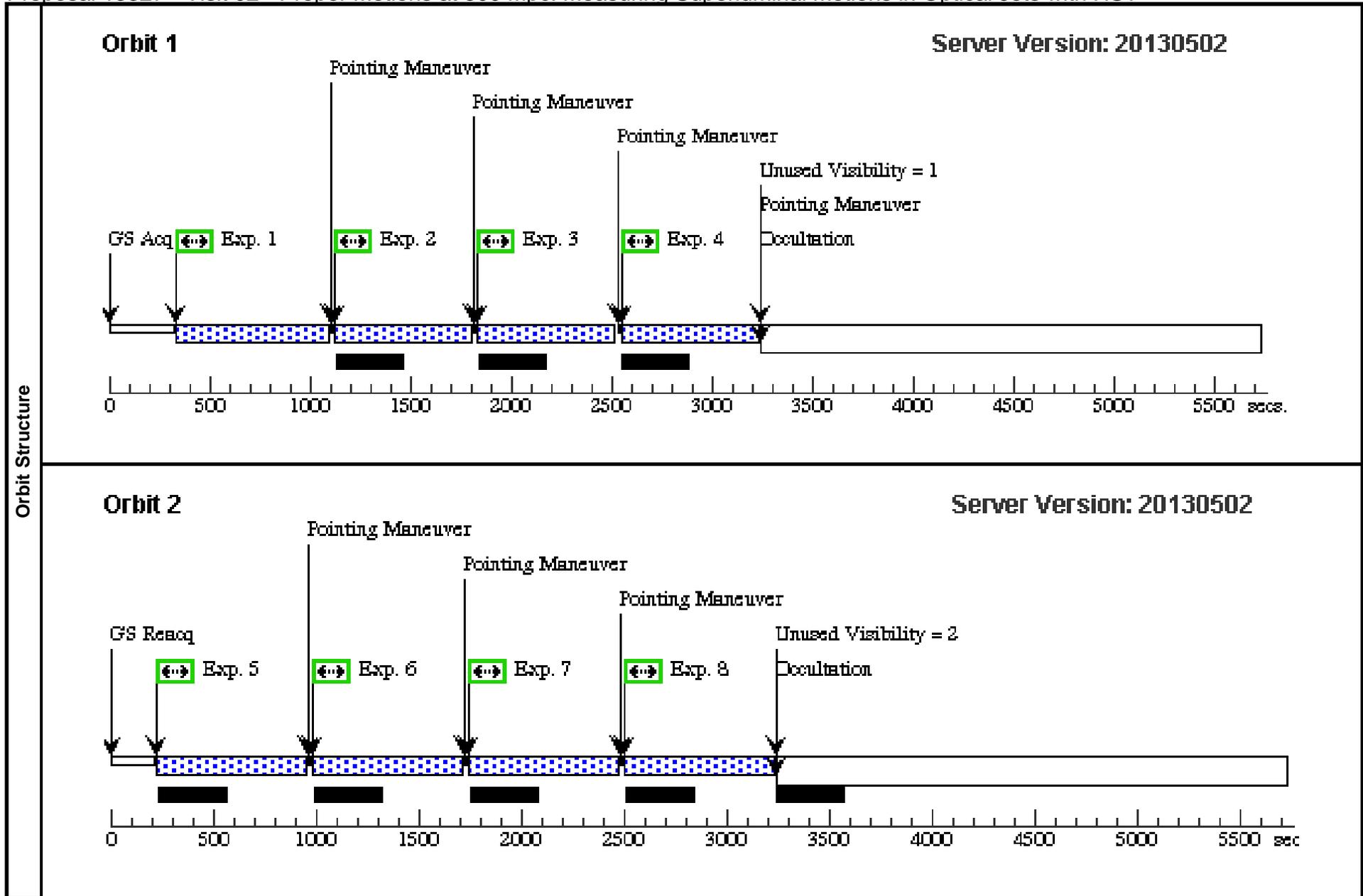
Server Version: 20130502



Proposal 13327 - Visit 02 - Proper Motions at 500 Mpc: Measuring Superluminal motions in Optical Jets with HST

Tue Jun 25 02:22:35 GMT 2013

Fixed Targets	Fixed Targets									
	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	3C264-JET	RA: 11 45 5.0000 (176.2708333d) Dec: +19 36 22.74 (19.60632d) Equinox: J2000		V=13.97	Reference Frame: SIMBAD				
	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(1) 3C264-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55,15		569 Secs (554 Secs) [=>554.0 Secs]	[1]
	2		(1) 3C264-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55.1740, 15.2350		569 Secs (554 Secs) [=>554.0 Secs]	[1]
	3		(1) 3C264-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55.3232, 15.1235		569 Secs (554 Secs) [=>554.0 Secs]	[1]
	4		(1) 3C264-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55.1005, 15.3305		569 Secs (554 Secs) [=>554.0 Secs]	[1]
	5		(1) 3C264-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55.5075, 15.0505		617 Secs (602 Secs) [=>602.0 Secs]	[2]
	6		(1) 3C264-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55.6815, 15.2855		617 Secs (602 Secs) [=>602.0 Secs]	[2]
	7		(1) 3C264-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55.8300, 15.1735		617 Secs (602 Secs) [=>602.0 Secs]	[2]
	8		(1) 3C264-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55.6080, 15.3810		617 Secs (602 Secs) [=>602.0 Secs]	[2]



Proposal 13327 - Visit 03 - Proper Motions at 500 Mpc: Measuring Superluminal motions in Optical Jets with HST

Tue Jun 25 02:22:38 GMT 2013

Fixed Targets	Visit									
	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	Proposal 13327, Visit 03 Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: (none)									
	(2)	3C346-JET	RA: 16 43 48.6290 (250.9526208d) Dec: +17 15 48.97 (17.26360d) Equinox: J2000		V=17.5	Reference Frame: SIMBAD				
	<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(2) 3C346-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55,15		569 Secs (554 Secs) [=>554.0 Secs]	[1]
	2		(2) 3C346-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55.1740, 15.2350		569 Secs (554 Secs) [=>554.0 Secs]	[1]
	3		(2) 3C346-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55.3232, 15.1235		569 Secs (554 Secs) [=>554.0 Secs]	[1]
	4		(2) 3C346-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55.1005, 15.3305		569 Secs (554 Secs) [=>554.0 Secs]	[1]
	5		(2) 3C346-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55.5075, 15.0505		617 Secs (602 Secs) [=>602.0 Secs]	[2]
	6		(2) 3C346-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55.6815, 15.2855		617 Secs (602 Secs) [=>602.0 Secs]	[2]
	7		(2) 3C346-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55.8300, 15.1735		617 Secs (602 Secs) [=>602.0 Secs]	[2]
	8		(2) 3C346-JET	ACS/WFC, ACCUM, WFC1	F606W		POS TARG 55.6080, 15.3810		617 Secs (602 Secs) [=>602.0 Secs]	[2]

