12374 - Alpha Cen to the Max

Cycle: 18, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Dr. Thomas R. Ayres (PI)	**University of Colorado at Boulder**	**Thomas.Ayres@Colorado.edu**

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) HD128620 (2) HD128621	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	3	08-Sep-2010 21:45:59.0	yes
02	(1) HD128620 (2) HD128621	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	3	08-Sep-2010 21:46:16.0	yes

6 Total Orbits Used

ABSTRACT

This is the HST part of a joint Chandra/HST observing program. The objective for HST is to obtain new UV spectra of both components of the Alpha Centauri binary: the primary ("Alpha Cen A") is a near twin of the Sun, while the companion ("B") is an early K dwarf, slightly less massive, smaller and less luminous than the Sun (but coronally more active). The orbital period is 80 yr, and the two stars currently are separated by about 7". The Alpha Cen system has been the subject of long term coronal X-ray monitoring by four successive generations of space observatories, and extensive UV measurements were obtained periodically during the IUE era, from the late 1970's to late 1990's. The present program will obtain new STIS echelle spectra of both stars, which each were observed in selected wavelength windows by GHRS in the mid-1990's, and Alpha Cen A later by

STIS in an extensive high-res program in 1999, then both stars this past HST Cycle 17 with STIS, as a part of a previous joint Chandra-HST program with similar objectives.

OBSERVING DESCRIPTION

The observing program is straightforward, although the acquisition is a bit tricky owing to the close separation of the two bright stars. The idea is to acquire, and peak up on, brighter "A" first , then perform an offset to the fainter B component, followed by a second acquisition and peak-up. This approach was used recently in Cycle 17 to obtain a full STIS echelle sequence on B. Unlike the usual offset situation, in which the offset star is utilized merely as a positional reference, here a series of E140M (and G230MB) exposures at A will be taken before moving on to the companion. Alpha Cen A already has been observed extensively with the STIS high-res echelles, and is so bright in the 2800 A continuum (where the important MgII doublet falls) that one of the ND apertures must be used to avoid an overlight condition on the NUV MAMA, which imposes a serious penalty in observing time. For the B component, it is possible to utilize the tiny Jenkins slit to reduce the NUV light levels sufficiently, but at the cost of a 2-step peak-up, and a still long exposure time. It was decided, therefore, to capture the key chromospheric MgII h & k emission features using G230MB-2836, which delivers lower resolution than the echelles (sufficient for the purpose, however), but the CCD is not subject to the MAMA intensity limits, and short exposures can provide high-S/N. The new medium-res FUV echelle measurements of A will complement the previous E140H spectra, and record with good sensitivity key high-temperature emission lines. These likely will be different during the contemporary starspot minimum of A, suggested by its depressed X-ray luminosity in the current epoch, compared with the cycle peak in 1999 when the prior E140H's were taken. In addition, virtually all other late-type stars have been observed at medium-res in the FUV, rather than in high-res, so the similar spectrum of bright Alpha Cen A will serve as a valuable reference. For Alpha Cen B, which recently was observed by STIS with full echelle coverage, the intent is to take a more limited series of medium-res echelle exposures to cover the important 1150-2400 A region at the highest resolution compatible with the limited observing time. (The 1700-2400 A spectrum of Alpha Cen A is dominated by photospheric continuum emission, and thus is less useful from a diagnostic point of view; Alpha Cen B, a cooler star, has minimal photospheric contamination in that interval.) Again, the centerpiece observation will be a deep E140M, which records the most valuable emission lines from a coronal activity perspective.

Alpha Cen A will be acquired initially with the MIRROR and F25ND5 aperture of the CCD, but is bright enough that it is best to do the peak-up in dispersed light. The G230MB-2836 setting provides good S/N with a short CCD exposure of 0.5 s. The ACQ/PEAK will be done with the narrow 0.2x0.06 slot to ensure good centering of the target for an accurate wavelength scale. This will be followed by an exposure of G230MB-2836 (8 s with CR-SPLIT=4) with the 52x0.2 slit to capture the MgII features; and an E140M (with the 0.2x0.2 photometric aperture for highest flux accuracy) for 5 ks in three subexposures (to mitigate thermal drifts). Then, the pointing will be shifted to the B component by the simple offset, and an ACQ with F25ND5 will be performed. This is followed by the narrow aperture ACQ/PEAK, again using the G230MB-2836 tilt, now with 1 s exposures. This will be followed by a G230MB-2836 (16 s, CR-SPLIT=4) through the 52x0.2 slit; an E230M-1978 of 2.2 ks in two segments (0.2x0.2 slot for optimum throughput); and finally a 5 ks E140M, again in three segements and again with the 0.2x0.2 slot. The exposure sequence requires 3 CVZ orbits, and will be repeated twice -- once in fall/winter 2010/11 and again roughly six months later in summer 2011 -- to track changes in the FUV emissions linked to evolution of the surface activity on the two stars as their starspot cycles progress.

Visit

Proposal 12374, Visit 01 Thu Sep 09 01:46:22 GMT 2010

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/FUV-MAMA, STIS/CCD, STIS/NUV-MAMA

Special Requirements: CVZ; BETWEEN 21-OCT-2010:12:00:00 AND 23-OCT-2010:12:00:00; BETWEEN 08-FEB-2011:12:00:00 AND 10-FEB-2011:12:00:00

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD128620 Alt Name1: ALP-CEN-A	RA: 14 39 31.2880 (219.8803667d) Dec: -60 49 59.06 (-60.83307d) Equinox: J2000	Proper Motion RA: -0.520s/yr Proper Motion Dec: +0.380"/yr Parallax: 0.747" Epoch of Position: 2010 Radial Velocity: -24 km/sec	V=-0.01 FUV peak fluxes are 5E-12 per Angstrom.	Reference Frame: ICRS

Comments: The position is for epoch 2010 with proper motion, orbital motion, and parallax taken into account. The cited proper motion values are appropriate to that epoch and also account for orbital motion in addition to the ordinary proper motion. This component ("A") will be utilized as an offset star for the fainter secondary ("B").

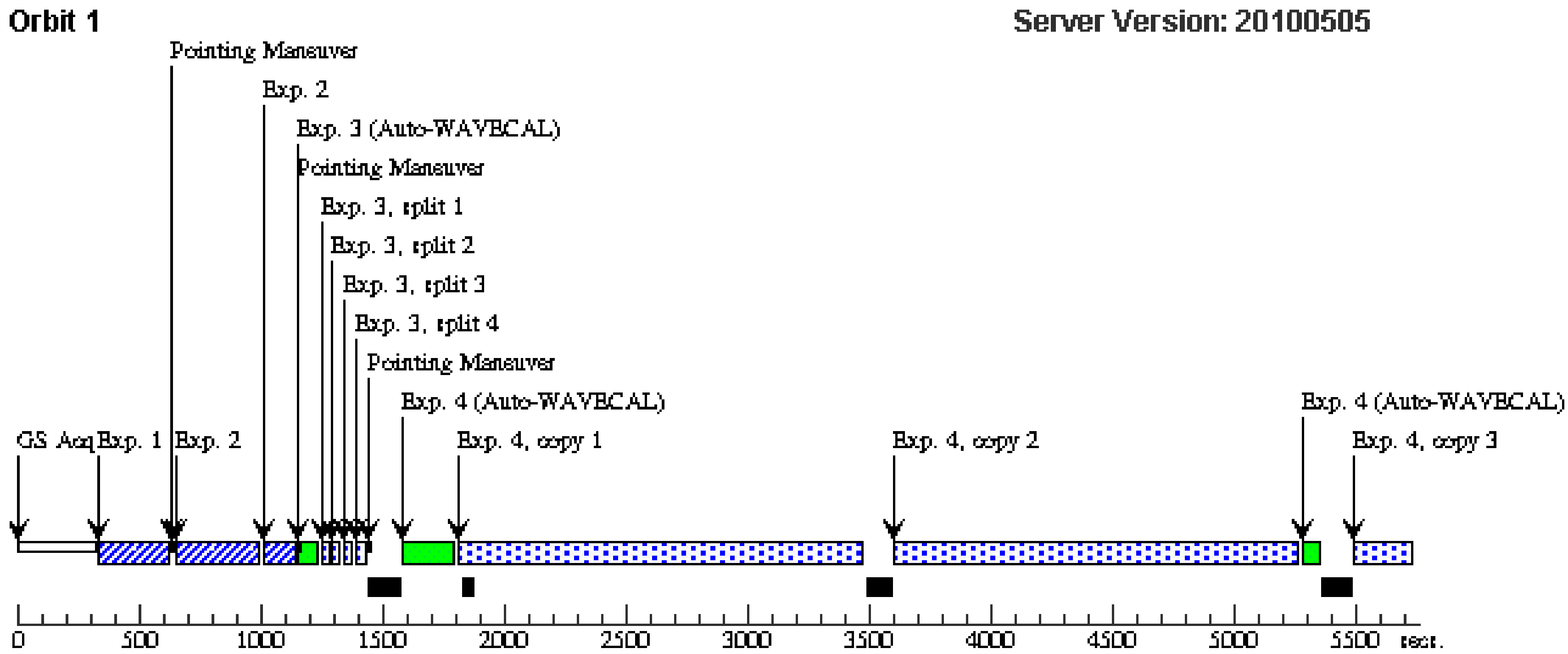
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	HD128621 Alt Name1: ALP-CEN-B	Offset from HD128620 by RA Offset: -0.77 Secs Dec Offset: -1.8 Arcsec	Proper Motion RA: 0.s/yr Proper Motion Dec: 0."/yr Parallax: 0." Epoch of Position: 2010 Radial Velocity: -24. km/sec	V=1.33 peak FUV flux 5E-12 per A; peak NUV flux 3E-10 (Mg II 2800); 1E-11 (continuum @ 2500 A); 5E-12 (lines @ 1950 A)	Offset Position (HD128621) Reference Frame: ICRS

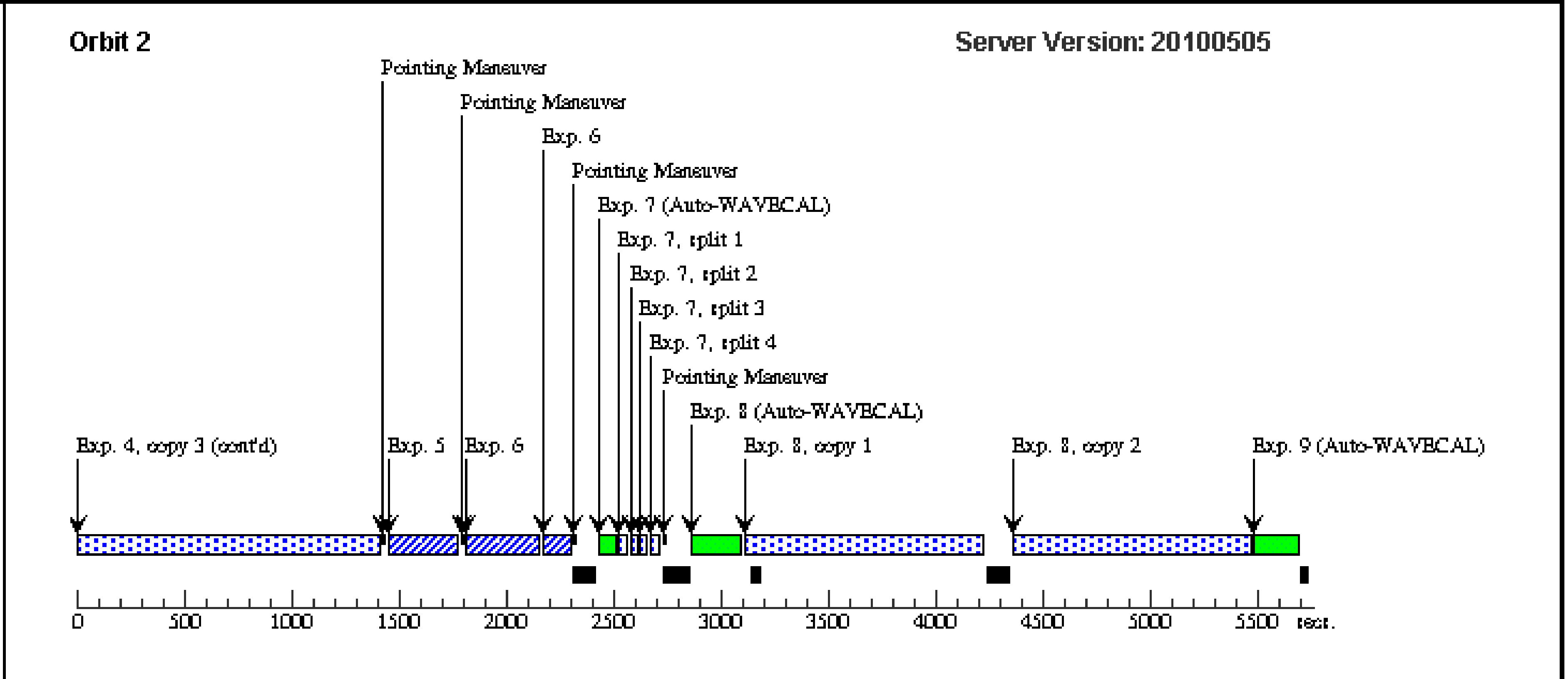
Comments: The offset given above is based on the relative orbit of B with respect to A, and is appropriate for 2010-2011.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) HD128620	STIS/CCD, ACQ, F25ND5	MIRROR				0.1 Secs *[==>]*	*[1]*
2		(1) HD128620	STIS/CCD, ACQ/PEAK, 0.2X0.06	G230MB 2836 A				0.5 Secs *[==>]*	*[1]*
3		(1) HD128620	STIS/CCD, ACCUM, 52X0.2	G230MB 2836 A	CR-SPLIT=4			8.0 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	*[1]*
4		(1) HD128620	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				1650 Secs X 3 *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]*	*[1]*
5		(2) HD128621	STIS/CCD, ACQ, F25ND5	MIRROR				0.1 Secs *[==>]*	*[2]*
6		(2) HD128621	STIS/CCD, ACQ/PEAK, 0.2X0.06	G230MB 2836 A				1.0 Secs *[==>]*	*[2]*
7		(2) HD128621	STIS/CCD, ACCUM, 52X0.2	G230MB 2836 A	CR-SPLIT=4			16.0 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	*[2]*
8		(2) HD128621	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 1978 A				1100 Secs X 2 *[==>(Copy 1)]* *[==>(Copy 2)]*	*[2]*
9		(2) HD128621	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				1650 Secs X 3 *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]*	*[3]*

Orbit Structure




Orbit 2
Server Version: 20100505
Pointing Maneuver
Pointing Maneuver
Exp. 6
Pointing Maneuver
Exp. 7 (Auto-WAVECAL)
Exp. 7, split 1
Exp. 7, split 2
Exp. 7, split 3
Exp. 7, split 4
Pointing Maneuver
Exp. 8 (Auto-WAVECAL)
Exp. 4, copy 3 (cont'd)
Exp. 5
Exp. 6
Exp. 8, copy 1
Exp. 8, copy 2
Exp. 9 (Auto-WAVECAL)
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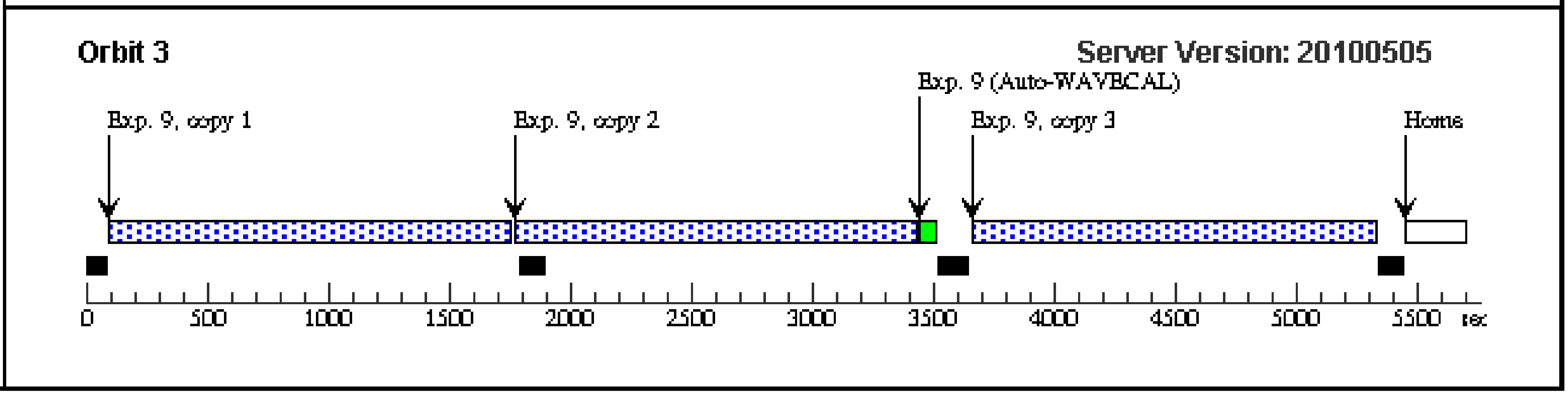
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Server Version: 20100505
Exp. 9 (Auto-WAVECAL)
Exp. 9, copy 1
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Exp. 9, copy 3
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Visit

Proposal 12374, Visit 02 Thu Sep 09 01:46:24 GMT 2010

Diagnostic Status: No Diagnostics

Scientific Instruments: STIS/FUV-MAMA, STIS/CCD, STIS/NUV-MAMA

Special Requirements: CVZ; BETWEEN 29-MAY-2011:12:00:00 AND 31-MAY-2011:12:00:00; BETWEEN 21-JUL-2011:12:00:00 AND 25-JUL-2011:12:00:00

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD128620 Alt Name1: ALP-CEN-A	RA: 14 39 31.2880 (219.8803667d) Dec: -60 49 59.06 (-60.83307d) Equinox: J2000	Proper Motion RA: -0.520s/yr Proper Motion Dec: +0.380"/yr Parallax: 0.747" Epoch of Position: 2010 Radial Velocity: -24 km/sec	V=-0.01 FUV peak fluxes are 5E-12 per Angstrom.	Reference Frame: ICRS
Comments: The position is for epoch 2010 with proper motion, orbital motion, and parallax taken into account. The cited proper motion values are appropriate to that epoch and also account for orbital motion in addition to the ordinary proper motion. This component ("A") will be utilized as an offset star for the fainter secondary ("B").					
(2)	HD128621 Alt Name1: ALP-CEN-B	Offset from HD128620 by RA Offset: -0.77 Secs Dec Offset: -1.8 Arcsec	Proper Motion RA: 0.s/yr Proper Motion Dec: 0."/yr Parallax: 0." Epoch of Position: 2010 Radial Velocity: -24. km/sec	V=1.33 peak FUV flux 5E-12 per A; pea k NUV flux 3E-10 (Mg II 2800); 1E-11 (continuum @ 2500 A); 5 E-12 (lines @ 1950 A)	Offset Position (HD128621) Reference Frame: ICRS
Comments: The offset given above is based on the relative orbit of B with respect to A, and is appropriate for 2010-2011.					

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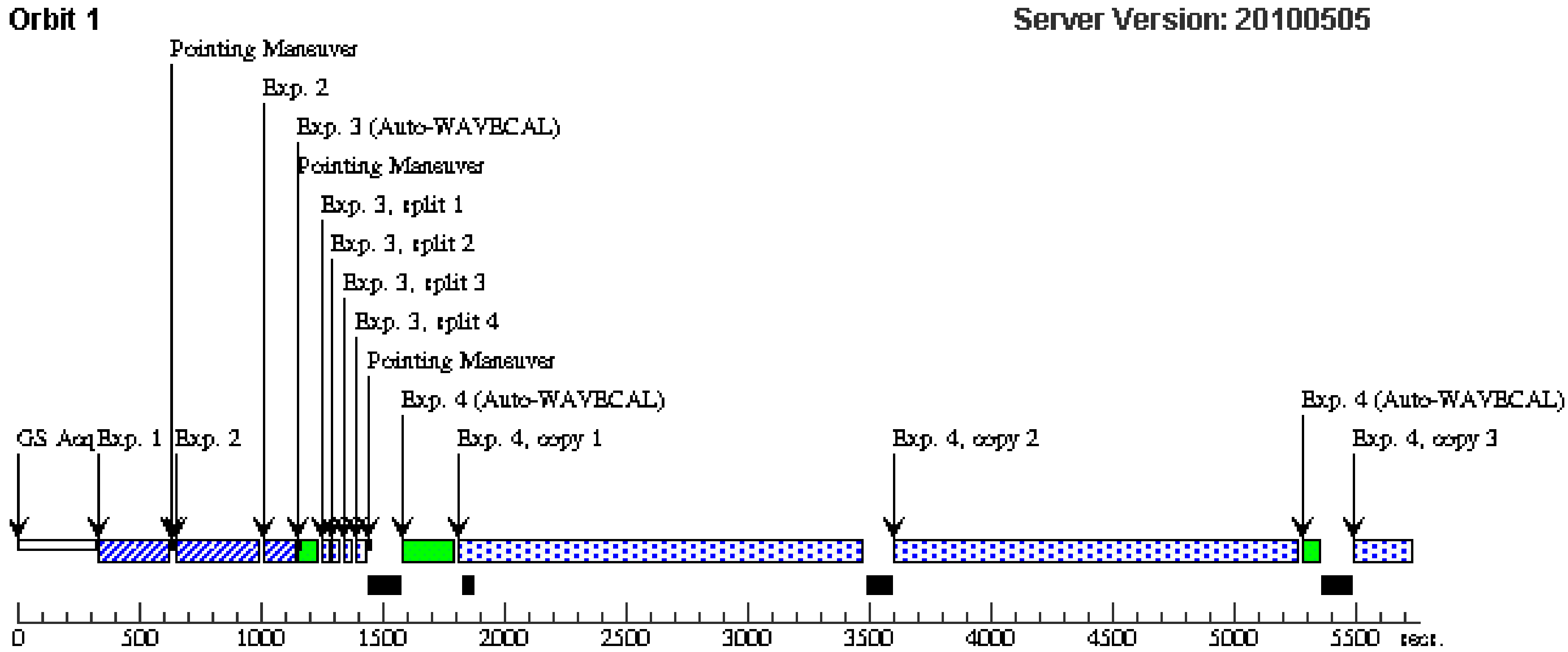
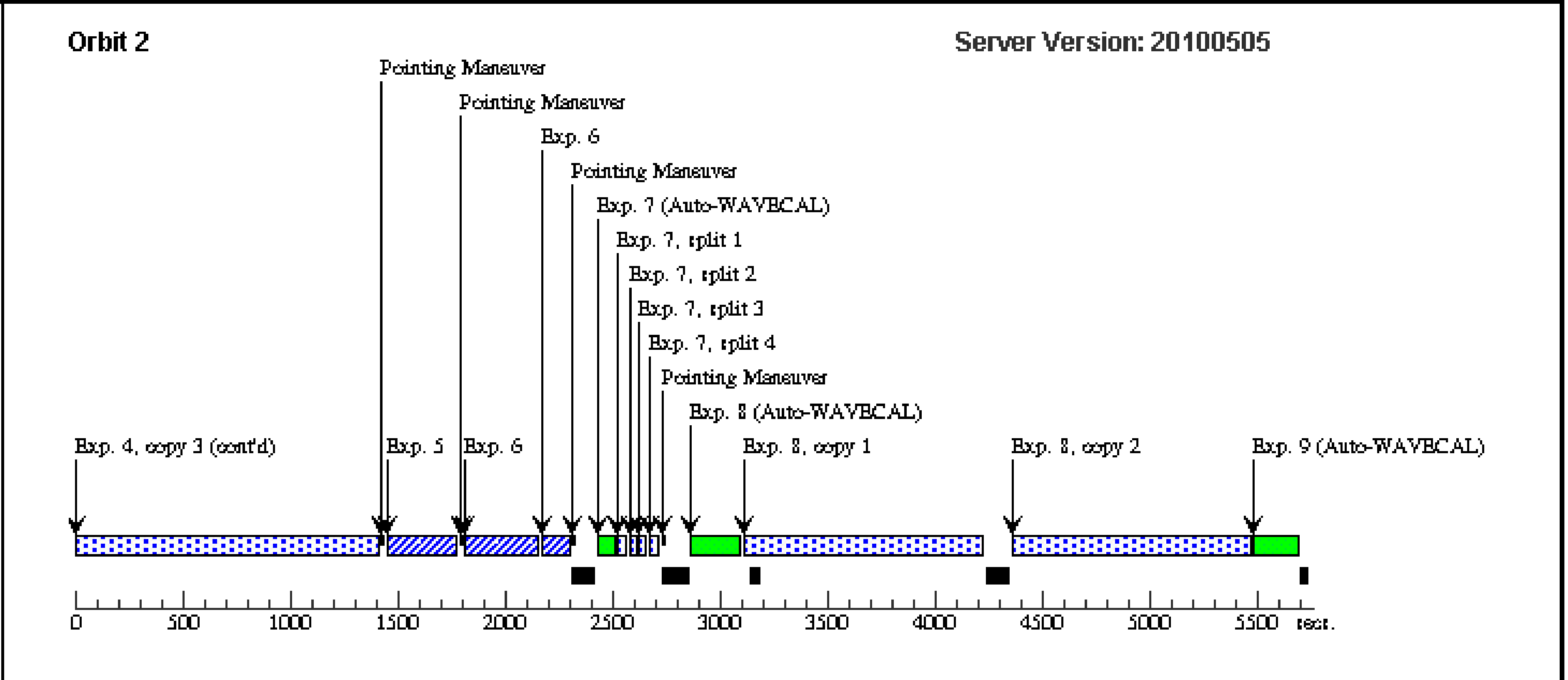
3		(1) HD128620	STIS/CCD, ACCUM, 52X0.2	G230MB 2836 A	CR-SPLIT=4			8.0 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	*[1]*
4		(1) HD128620	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				1650 Secs X 3 *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]*	*[1]*
5		(2) HD128621	STIS/CCD, ACQ, F25ND5	MIRROR				0.1 Secs *[==>]*	*[2]*
6		(2) HD128621	STIS/CCD, ACQ/PEAK, 0.2X0.06	G230MB 2836 A				1.0 Secs *[==>]*	*[2]*
7		(2) HD128621	STIS/CCD, ACCUM, 52X0.2	G230MB 2836 A	CR-SPLIT=4			16.0 Secs *[==>(Split 1)]* *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	*[2]*
8		(2) HD128621	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 1978 A				1100 Secs X 2 *[==>(Copy 1)]* *[==>(Copy 2)]*	*[2]*
9		(2) HD128621	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				1650 Secs X 3 *[==>(Copy 1)]* *[==>(Copy 2)]* *[==>(Copy 3)]*	*[3]*

Orbit Structure




Orbit 2
Server Version: 20100505
Pointing Maneuver
Pointing Maneuver
Exp. 6
Pointing Maneuver
Exp. 7 (Auto-WAVECAL)
Exp. 7, split 1
Exp. 7, split 2
Exp. 7, split 3
Exp. 7, split 4
Pointing Maneuver
Exp. 8 (Auto-WAVECAL)
Exp. 4, copy 3 (cont'd)
Exp. 5
Exp. 6
Exp. 8, copy 1
Exp. 8, copy 2
Exp. 9 (Auto-WAVECAL)
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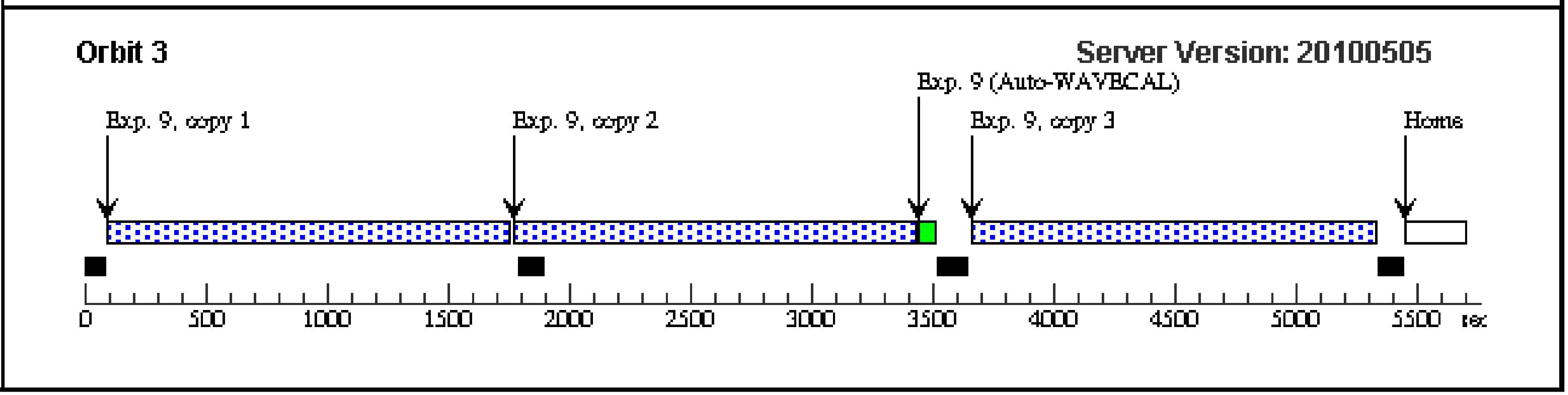
Orbit 3
Server Version: 20100505
Exp. 9 (Auto-WAVECAL)
Exp. 9, copy 1
Exp. 9, copy 2
Exp. 9, copy 3
Home
0 500 1000 1500 2000 2500 3000 3500 4000 4500 5000 5500 sec