10568 - Ultraviolet spectrum of the binary millisecond pulsar J0437-4715

Cycle: 14, Proposal Category: GO

(Availability Mode: AVAILABLE)

INVESTIGATORS

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VISITS

Visit	*Targets*	*Configurations*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) PSRJ0437-4715	ACS/HRC	3	25-Apr-2006 11:25:10.0	yes
02	(1) PSRJ0437-4715	ACS/SBC	3	25-Apr-2006 11:25:15.0	yes
52	(1) PSRJ0437-4715	ACS/SBC	1	25-Apr-2006 11:25:17.0	yes
03	(1) PSRJ0437-4715	ACS/SBC	3	25-Apr-2006 11:25:20.0	yes
04	(1) PSRJ0437-4715	ACS/SBC	3	25-Apr-2006 11:25:23.0	yes
05	(1) PSRJ0437-4715	ACS/SBC	2	25-Apr-2006 11:25:26.0	yes

15 Total Orbits Used

ABSTRACT

PSR J0437-4715 is the nearest and the brightest millisecond (recycled) pulsar, and the only one detected at near-optical wavelengths. We detected it with the HST STIS/FUV-MAMA detector and found that its FUV spectrum is consistent with being emitted from the neutron star surface with a

temperature of about 0.1 MK, surprisingly high for such an old object. We also found evidence of an emission line at 1372 A, tentatively interpreted as a Zeeman component of the hydrogen Ly-alpha line in a magnetic field of 700 MG. Unfortunately, the spectrum was imaged in a region of strong detector background, which strongly hampered the spectral analyses. We propose to re-observe the pulsar with the ACS/SBC in FUV and ACS/HRC in NUV to obtain the spectrum of the pulsar in a broad UV range. The spectral analysis will allow us to measure the temperature of the full neutron star surface and probe the heating mechanisms operating in old neutron stars. Confirmation of the spectral line would lead to a first direct measuremnt of the magnetic field and the radius of a spin-powered neutron star and uniquely constrain the equation of state of superdense matter. The NUV spectrum will also probe the magnetospheric emission and the thermal structure of the cool white dwarf companion.

OBSERVING DESCRIPTION

We propose to observe J0437 with the ACS HRC and SBC detectors. The SBC-MAMA will be used to measure the spectrum in the 1250-1800 A range and to confirm the 1372 A line. We will use the PR130L prism to obtain a dispersed low-resolution FUV spectrum with a wavelength-dependent resolution. To obtain a good fit with at least 3 fitting parameters (e.g., temperature, size, and extinction, for the thermal model), the spectrum must be detected in at least 8 wavelength bins with S/N > 8. Because of the lack of a slit, the SBC background over the whole field of view (FOV) will be dominated by emission from the strong geocoronal OI lines at 1304 and 1356 A (hydrogen Ly-alpha line at 1216 A will be cut-off by the prism throughput). Because the bright geocoronal background would severely compromise the observed pulsar spectrum, we request the target to be observed in the Earth shadow to minimize the contribution of the geocoronal background. With the SHADOW requirement the ETC calculations show that we can achieve S/N>8 in 8 spectral bins in a 17.6 ks scientific exposure with SBC/PR130L. This exposure will require 11 HST orbits (1600 ks per orbit), with allowance for the acquisition exposures and instrument overheads. To increase the efficiency of the observation and to better calibrate the wavelength zero-point for the PRISM exposures, we will also take images with SBC/F140LP during the non-SHADOW part of each orbit (850 s scientific exposure per orbit; total 9.35 ks). Using the F140LP filter will allow us to cut off most of the geocoronal emission and detect the pulsar with S/N>13 in a 2 ks exposure (i.e. within one three-orbit visit)

To obtain a low-resolution NUV spectrum (1900-4500 A), we will use the HRC with PR200L prism. The sensitivity of HRC/PR200L is much higher than that of SBC/PR130L, and ETC calculation shows that a sufficiently good spectrum can be obtained with an "average" (default) ETC settings for the sky background. Therefore, we do not need the SHADOW requirement for this part of the observation. To estimate S/N with ETC, we used a

three-component source spectral model: NS thermal emission + pulsar magnetospheric emission + WD atmosphere emission. For various combinations of these components, consistent with the previous FUV data, we obtained the distributions of counts over dispersion pixels and calculated the count rates in various wavelength bins. We found that at the lowest reasonable fluxes in the three source components (zero magnetospheric component, lower limit on the thermal NS component, and 4000 K blackbody WD spectrum) we will measure the spectrum with S/N varying from 6 (at the shortest wavelengths) to 100 (at longer wavelengths) in 11 wavelength bins in a 1900-4300 A range in a 7.6 ks exposure (3 orbits, with allowance for overheads). Assuming the strongest magnetospheric component as allowed by the FUV spectrum and the correspondingly fainter thermal NS component, the 7.6 ks exposure will give us a spectrum with S/N > 8 in 11 bins in a 1900-4300 A range. At the intermediate wavelengths, 2800-3800 A, expected S/N values are 20-50, regardless of the magnetospheric component strength. The number of spectral bins and/or S/N will be further increased if the WD atmosphere flux exceeds the 4000 K blackbody flux in the NUV range. To better calibrate the wavelength zero-point in the spectroscopic exposures with PR200L prism, we will also take 3 short imaging exposures. The first one is the default AUTOIMAGE exposure (360 s with HRC/F330W). It will be taken during the first orbit and should detect the pulsar's WD companion with S/N>13. The second and third imaging exposures (100 s long each; both with HRC/F555W filter) will be taken during the 2nd and 3rd orbits, respectively. In each of this exposures the WD will be detected with S/N>30 (the WD is brighter in the V band). During the second and third orbits no AUTOIMAGE (360 s with FHRC/F330W) should be taken.

Visit

Proposal 10568, Visit 01 Tue Apr 25 15:25:27 GMT 2006

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/HRC

Special Requirements: (none)

Comments: NUV spectroscopy with PR200L prism.

Fixed Targets

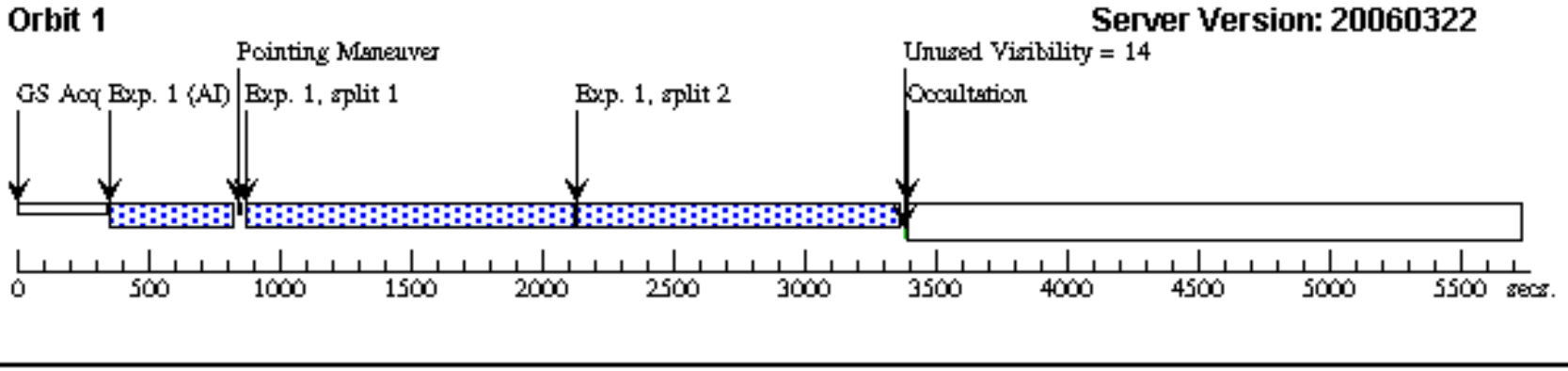
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	PSRJ0437-4715	RA: 04 37 15.8400 (69.3160000d) Dec: -47 15 8.63 (-47.25240d) Equinox: J2000 Plate Id: 03C1		V=20.9+/-0.1 B-V=1.2+/-0.1, R=20.1+/-0.1, I=19.4+/-0.1	Coordinate Source: HST_IMAGE

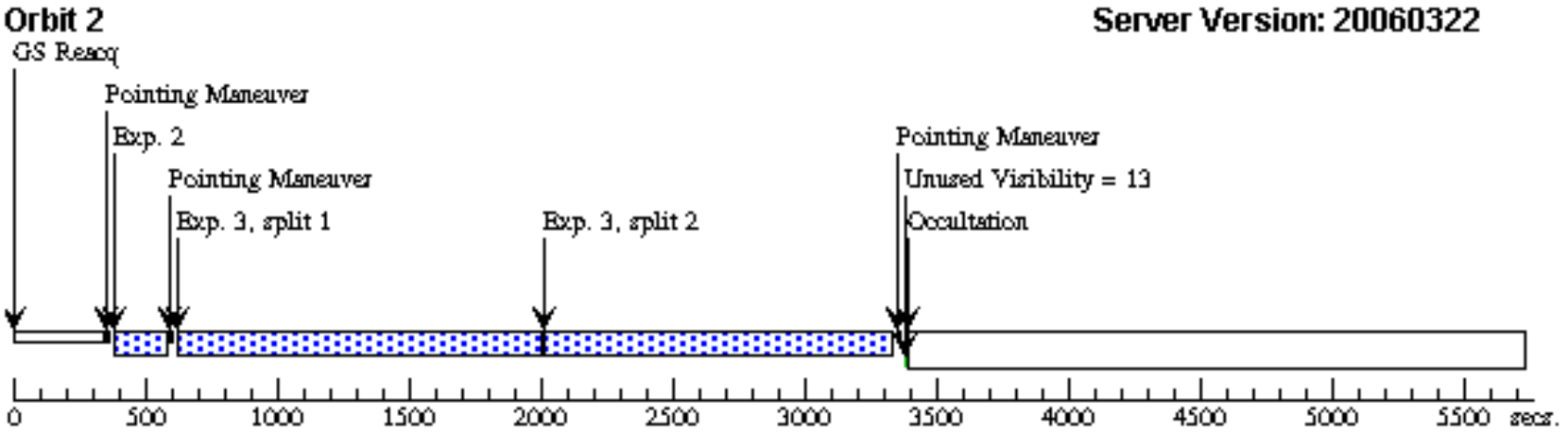
Comments: This binary pulsar has a proper motion (+121,-71) mas/yr. The position has been measured from the HST STIS/CCD image of 2001.65 and computed for 2006.0. This observation does not require on-board aquisition. A pointing accuracy of 2" is sufficient.

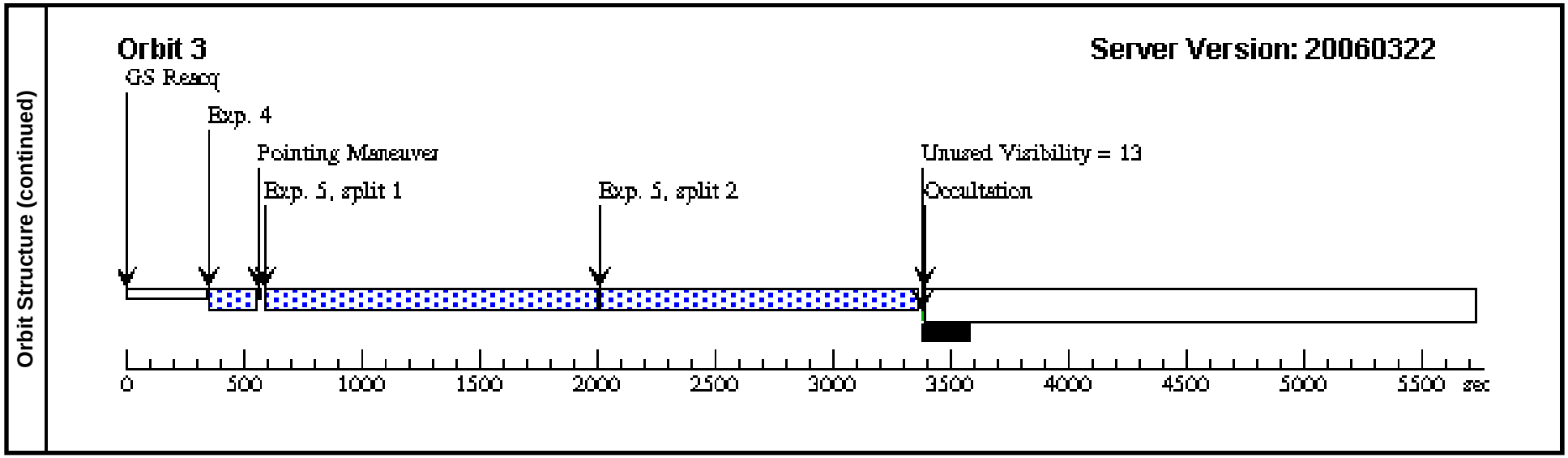
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) PSRJ0437-4715	ACS/HRC, ACCUM, HRC	PR200L				2396.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[1]***
Comments: First orbit. The default AUTOIMAGE is taken during this orbit.									
2		(1) PSRJ0437-4715	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO			100.0 Secs *[==>]*	***[2]***
Comments: Second orbit, 100 s V-band imaging exposure is taken for wavelength calibraration instead of the default AUTOIMAGE. We require the direct image to be centered at the same position on the detector as the prism image.									
3		(1) PSRJ0437-4715	ACS/HRC, ACCUM, HRC	PR200L	AUTOIMAGE=NO			2580.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[2]***
Comments: We request AUTOIMAGE=NO for this exposure since the 100 s F555W image is taken instead.									
4		(1) PSRJ0437-4715	ACS/HRC, ACCUM, HRC	F555W	CR-SPLIT=NO			100.0 Secs *[==>]*	***[3]***
Comments: Third orbit, 100 s V-band imaging exposure taken for wavelength calibraration instead of the default AUTOIMAGE. We require the direct image to be centered at the same position on the detector as the prism image.									
5		(1) PSRJ0437-4715	ACS/HRC, ACCUM, HRC	PR200L	AUTOIMAGE=NO			2637.0 Secs *[==>(Split 1)]* *[==>(Split 2)]*	***[3]***
Comments: We request AUTOIMAGE=NO for this exposure since the 100 s F555W image is taken instead.									

Orbit Structure



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Pointing Maneuver
Exp. 5, split 1
Exp. 5, split 2
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1500
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sec

Visit

Proposal 10568, Visit 02 Tue Apr 25 15:25:28 GMT 2006

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/SBC

Special Requirements: ORIENT 15.0D TO 40.0 D; ORIENT 100.0D TO 250.0 D; ORIENT 275.0D TO 320.0 D

Comments: FUV spectroscopy with SBC and PR1300L. The ORIENT is restricted to avoid a potentially bright nearby galaxy.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	PSRJ0437-4715	RA: 04 37 15.8400 (69.3160000d) Dec: -47 15 8.63 (-47.25240d) Equinox: J2000 Plate Id: 03C1		V=20.9+/-0.1 B-V=1.2+/-0.1, R=20.1+/-0.1, I=19.4+/-0.1	Coordinate Source: HST_IMAGE

Comments: This binary pulsar has a proper motion (+121,-71) mas/yr. The position has been measured from the HST STIS/CCD image of 2001.65 and computed for 2006.0. This observation does not require on-board aquisition. A pointing accuracy of 2" is sufficient.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) PSRJ0437-4715	ACS/SBC, ACCUM, SBC	PR130L		SHADOW		1600.0 Secs *[==>]*	 ***[1]***

Comments: This is 1st spectroscopic exposure taken with the SHADOW requirement. It should be followed (or preceded) by the imaging exposure taken outside the SHADOW during the same orbit.

2		(1) PSRJ0437-4715	ACS/SBC, ACCUM, SBC	F140LP				850.0 Secs *[==>]*	 ***[1]***

Comments: This is 1st imaging exposure taken outside the SHADOW. It should follow (or precede) the 1st spectroscopic exposure taken within the SHADOW during the same orbit. We require the direct image to be centered at the same position on the detector as the prism image.

3		(1) PSRJ0437-4715	ACS/SBC, ACCUM, SBC	PR130L		SHADOW		1600.0 Secs *[==>]*	 ***[2]***

Comments: This is 2nd spectroscopic exposure taken with the SHADOW requirement. It should be followed (or preceded) by the imaging exposure taken outside the SHADOW during the same orbit.

4		(1) PSRJ0437-4715	ACS/SBC, ACCUM, SBC	F140LP				850.0 Secs *[==>]*	 ***[2]***

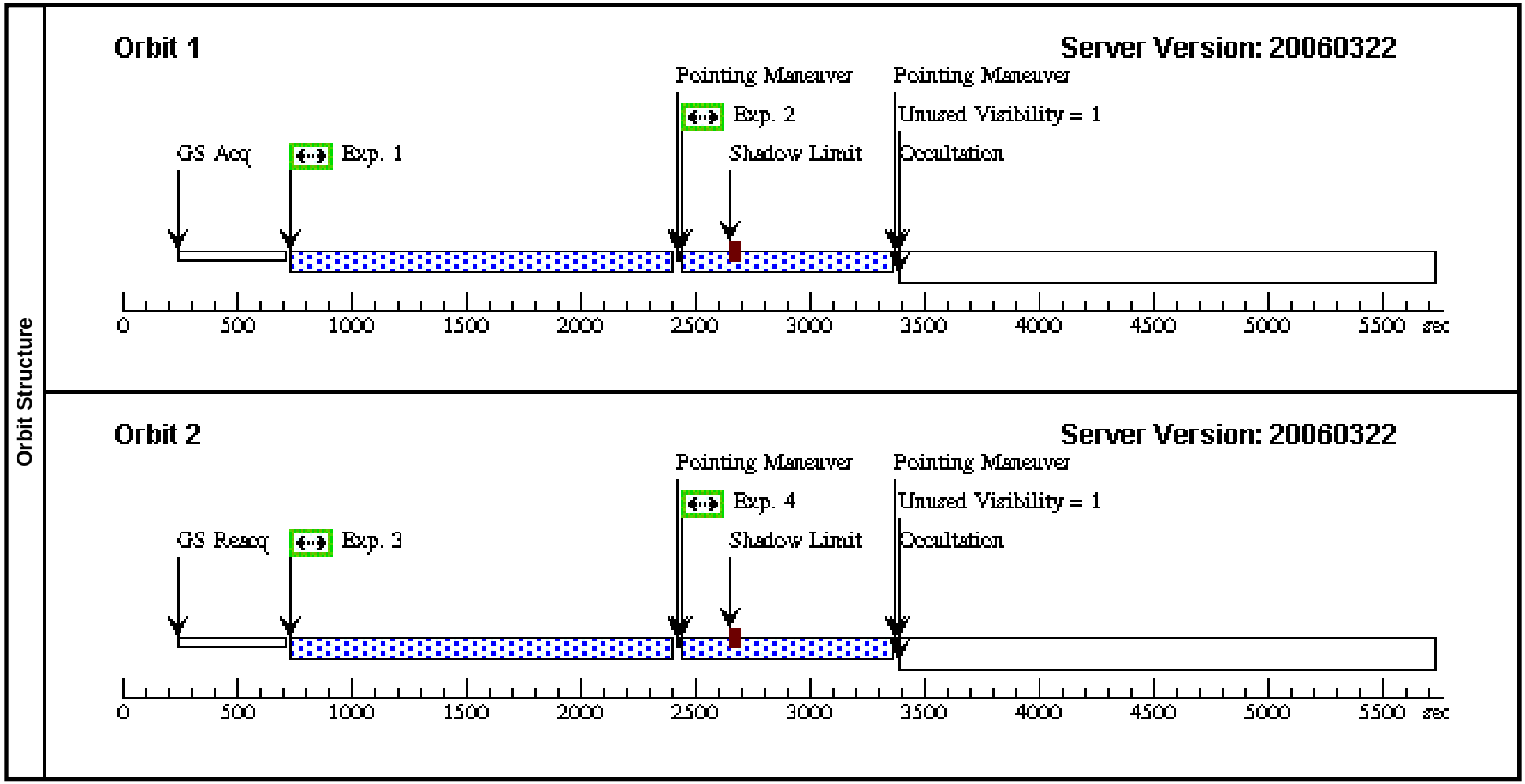
Comments: This is 2nd imaging exposure taken outside the SHADOW. It should follow (or precede) the 2nd spectroscopic exposure taken within the SHADOW during the same orbit. We require the direct image to be centered at the same position on the detector as the prism image.

5		(1) PSRJ0437-4715	ACS/SBC, ACCUM, SBC	PR130L		SHADOW		1600.0 Secs *[==>]*	 ***[3]***

Comments: This is 3rd spectroscopic exposure taken with the SHADOW requirement. It should be followed (or preceded) by the imaging exposure taken outside the SHADOW during the same orbit.

6		(1) PSRJ0437-4715	ACS/SBC, ACCUM, SBC	F140LP				850.0 Secs *[==>]*	 ***[3]***

Comments: This is 3rd imaging exposure taken outside the SHADOW. It should follow (or precede) the 3rd spectroscopic exposure taken within the SHADOW during the same orbit. We require the direct image to be centered at the same position on the detector as the prism image.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Exp. 1
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4500
5000
5500
sec
Orbit 2
Server Version: 20060322
Pointing Maneuver
Pointing Maneuver
Exp. 4
Unused Visibility = 1
GS Reacq
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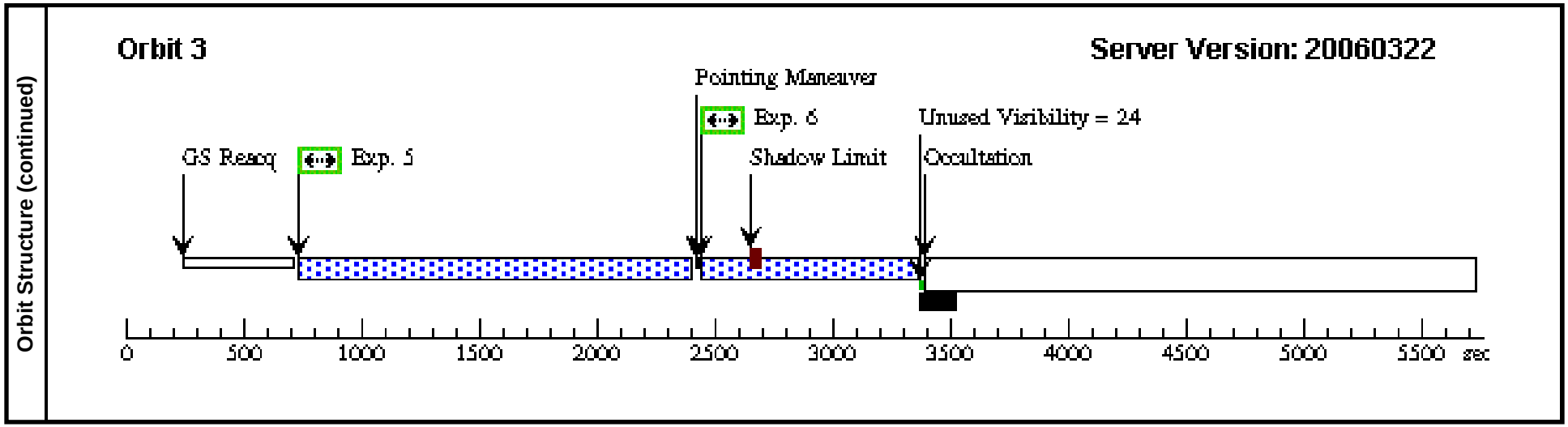
sec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Server Version: 20060322
Pointing Maneuver
Exp. 6
Unused Visibility = 24
GS Reacq
Exp. 5
Shadow Limit
Occultation
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500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 10568, Visit 52 Tue Apr 25 15:25:29 GMT 2006

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/SBC

Special Requirements: ORIENT 110.0D TO 320.0 D

Comments: FUV spectroscopy with SBC and PR1300L. The ORIENT is restricted to avoid a potentially bright nearby galaxy. We apply POS TARG Y-OFFSET=-4.5" to reduce the impact of the SBC thermal glow.

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	PSRJ0437-4715	RA: 04 37 15.8400 (69.3160000d)		V=20.9+/-0.1	Coordinate Source: HST_IMAGE
		Dec: -47 15 8.63 (-47.25240d)		B-V=1.2+/-0.1,	
		Equinox: J2000		R=20.1+/-0.1,	
		Plate Id: 03C1		I=19.4+/-0.1	

Comments: This binary pulsar has a proper motion (+121,-71) mas/yr. The position has been measured from the HST STIS/CCD image of 2001.65 and computed for 2006.0. This observation does not require on-board aquisition. A pointing accuracy of 2" is sufficient.

Exposures

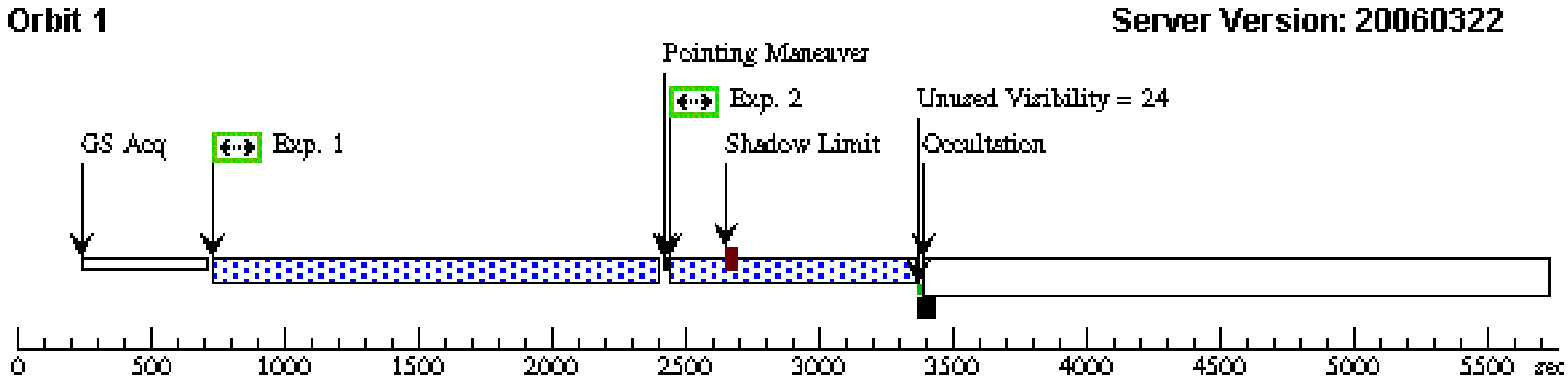
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) PSRJ0437-4715	ACS/SBC, ACCUM, SBC	PR130L		POS TARG 0,-4.5;		1600.0 Secs	
						SHADOW		*[==>]*	***[1]***

Comments: This is 2nd spectroscopic exposure taken with the SHADOW requirement. It should be followed (or preceded) by the imaging exposure taken outside the SHADOW during the same orbit.

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
2		(1) PSRJ0437-4715	ACS/SBC, ACCUM, SBC	F140LP		POS TARG 0,-4.5		850.0 Secs	
								[==>]	***[1]***

Comments: This is 2nd imaging exposure taken outside the SHADOW. It should follow (or precede) the 2nd spectroscopic exposure taken within the SHADOW during the same orbit. We require the direct image to be centered at the same position on the detector as the prism image.

Orbit Structure



Visit

Proposal 10568, Visit 03 Tue Apr 25 15:25:30 GMT 2006

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/SBC

Special Requirements: ORIENT 110.0D TO 320.0 D

Comments: FUV spectroscopy with SBC and PR1300L. The ORIENT is restricted to avoid a potentially bright nearby galaxy. We apply POS TARG Y-OFFSET=-4.5" to reduce the impact of the SBC thermal glow.

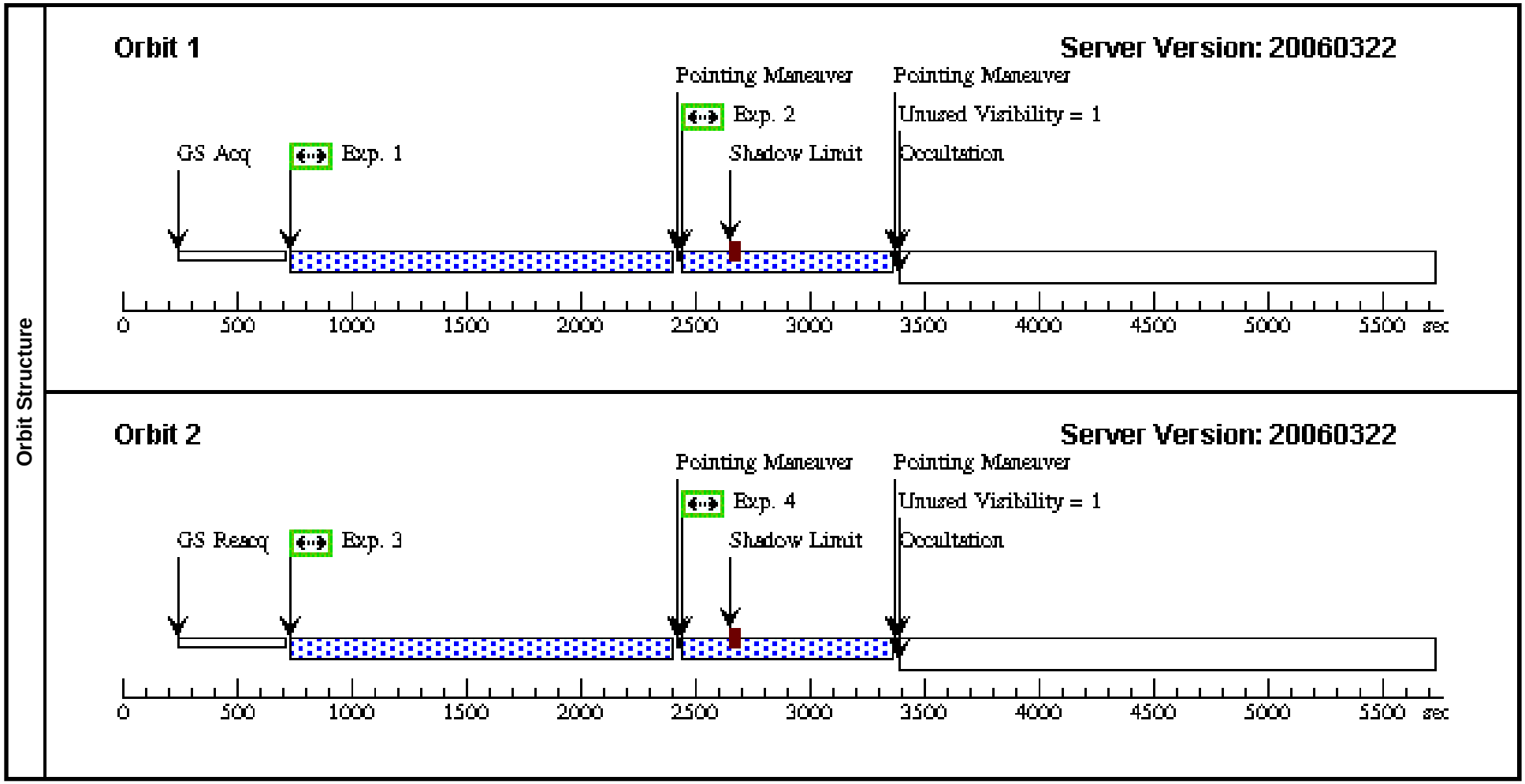
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	PSRJ0437-4715	RA: 04 37 15.8400 (69.3160000d)		V=20.9+/-0.1	Coordinate Source: HST_IMAGE
		Dec: -47 15 8.63 (-47.25240d)		B-V=1.2+/-0.1,	
		Equinox: J2000		R=20.1+/-0.1,	
		Plate Id: 03C1		I=19.4+/-0.1	

Comments: This binary pulsar has a proper motion (+121,-71) mas/yr. The position has been measured from the HST STIS/CCD image of 2001.65 and computed for 2006.0. This observation does not require on-board aquisition. A pointing accuracy of 2" is sufficient.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) PSRJ0437-4715	ACS/SBC, ACCUM, SBC	PR130L		POS TARG 0,-4.5;		1600.0 Secs	
						SHADOW		*[==>]*	***[1]***
Comments: This is 1st spectroscopic exposure taken with the SHADOW requirement. It should be followed (or preceded) by the imaging exposure taken outside the SHADOW during the same orbit.									
2		(1) PSRJ0437-4715	ACS/SBC, ACCUM, SBC	F140LP		POS TARG 0,-4.5		850.0 Secs	
								[==>]	***[1]***
Comments: This is 1st imaging exposure taken outside the SHADOW. It should follow (or precede) the 1st spectroscopic exposure taken within the SHADOW during the same orbit. We require the direct image to be c entered at the same position on the detector as the prism image.									
3		(1) PSRJ0437-4715	ACS/SBC, ACCUM, SBC	PR130L		POS TARG 0,-4.5;		1600.0 Secs	
						SHADOW		*[==>]*	***[2]***
Comments: This is 2nd spectroscopic exposure taken with the SHADOW requirement. It should be followed (or preceded) by the imaging exposure taken outside the SHADOW during the same orbit.									
4		(1) PSRJ0437-4715	ACS/SBC, ACCUM, SBC	F140LP		POS TARG 0,-4.5		850.0 Secs	
								[==>]	***[2]***
Comments: This is 2nd imaging exposure taken outside the SHADOW. It should follow (or precede) the 2nd spectroscopic exposure taken within the SHADOW during the same orbit. We require the direct image to be centered at the same position on the detector as the prism image.									
5		(1) PSRJ0437-4715	ACS/SBC, ACCUM, SBC	PR130L		POS TARG 0,-4.5;		1600.0 Secs	
						SHADOW		*[==>]*	***[3]***
Comments: This is 3rd spectroscopic exposure taken with the SHADOW requirement. It should be followed (or preceded) by the imaging exposure taken outside the SHADOW during the same orbit.									
6		(1) PSRJ0437-4715	ACS/SBC, ACCUM, SBC	F140LP		POS TARG 0,-4.5		850.0 Secs	
								[==>]	***[3]***
Comments: This is 3rd imaging exposure taken outside the SHADOW. It should follow (or precede) the 3rd spectroscopic exposure taken within the SHADOW during the same orbit. We require the direct image to be centered at the same position on the detector as the prism image.									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sec
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Server Version: 20060322
Pointing Maneuver
Pointing Maneuver
Exp. 4
Unused Visibility = 1
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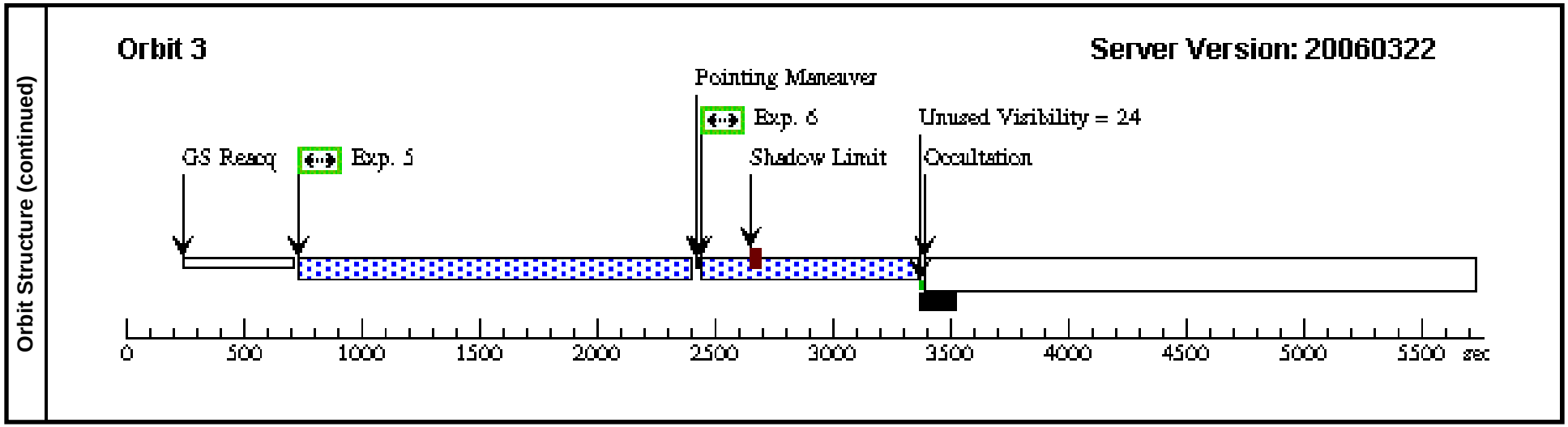
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Pointing Maneuver
Exp. 6
Unused Visibility = 24
GS Reacq
Exp. 5
Shadow Limit
Occultation
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500
1000
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2000
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4500
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sec

Visit

Proposal 10568, Visit 04 Tue Apr 25 15:25:30 GMT 2006

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/SBC

Special Requirements: ORIENT 110.0D TO 320.0 D

Comments: FUV spectroscopy with SBC and PR1300L. The ORIENT is restricted to avoid a potentially bright nearby galaxy. We apply POS TARG Y-OFFSET=-4.5" to reduce the impact of the SBC thermal glow.

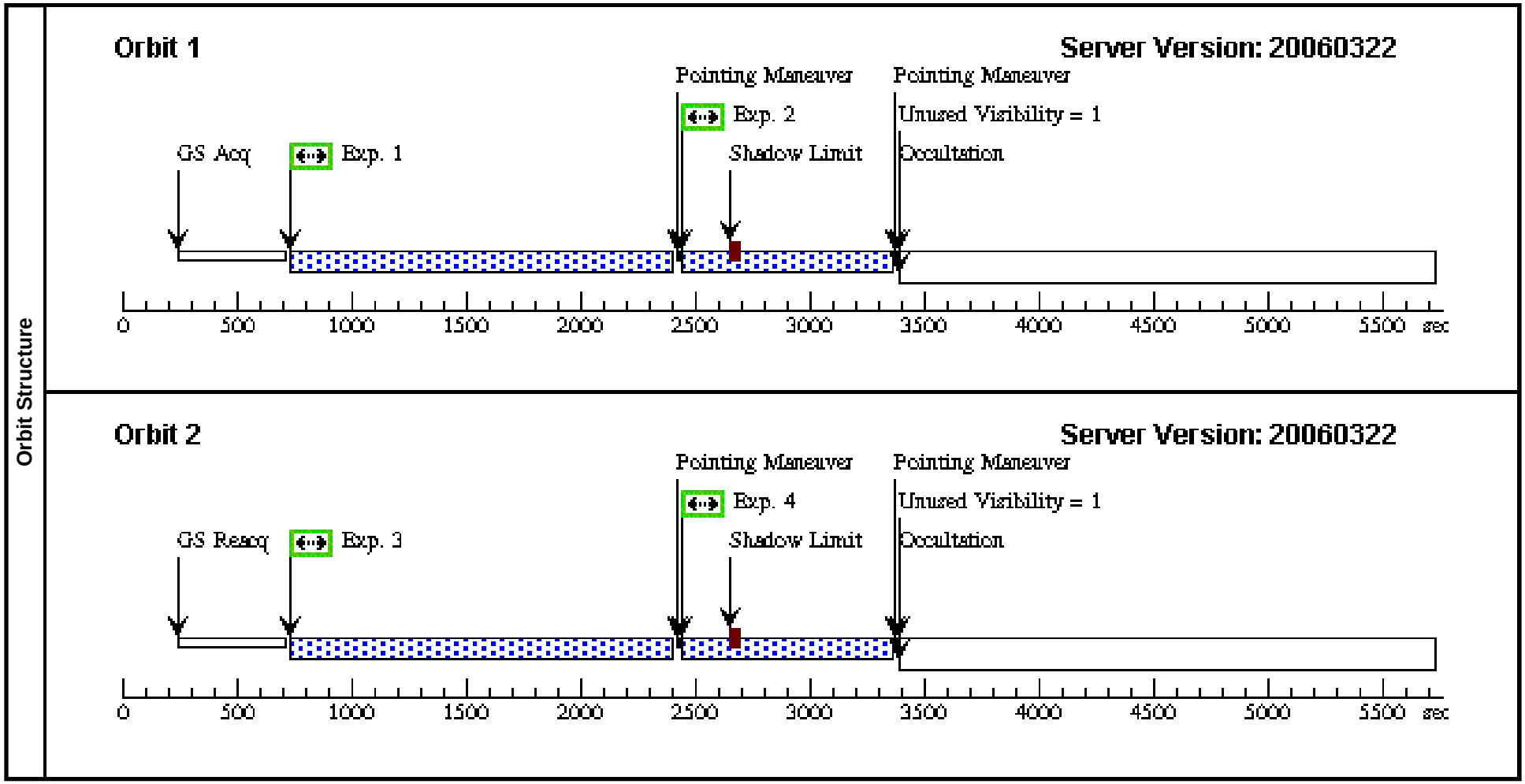
Fixed Targets

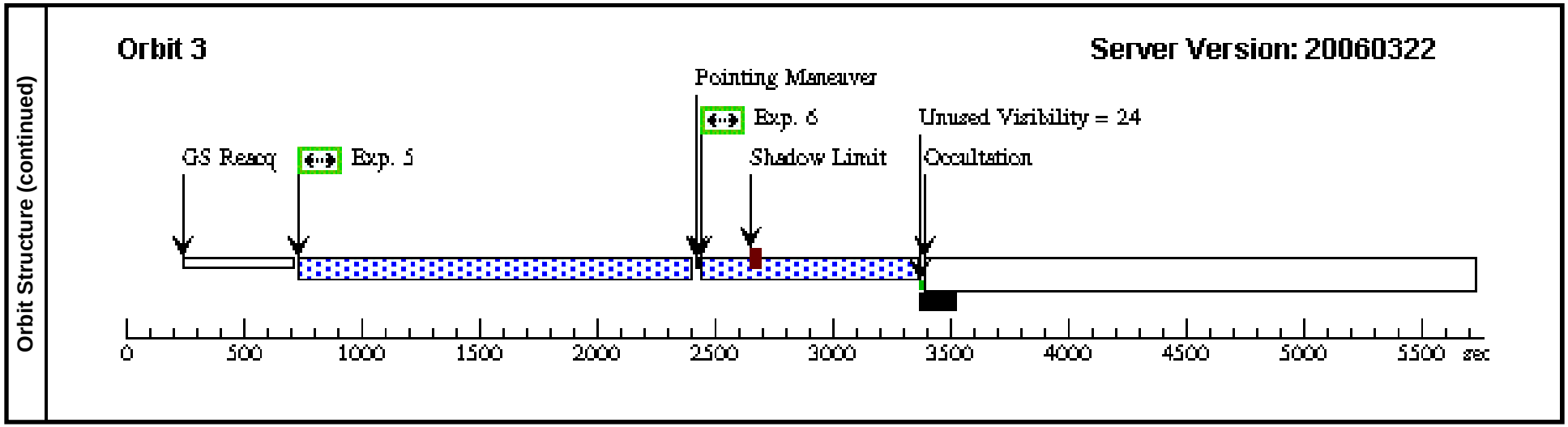
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	PSRJ0437-4715	RA: 04 37 15.8400 (69.3160000d)		V=20.9+/-0.1	Coordinate Source: HST_IMAGE
		Dec: -47 15 8.63 (-47.25240d)		B-V=1.2+/-0.1,	
		Equinox: J2000		R=20.1+/-0.1,	
		Plate Id: 03C1		I=19.4+/-0.1	

Comments: This binary pulsar has a proper motion (+121,-71) mas/yr. The position has been measured from the HST STIS/CCD image of 2001.65 and computed for 2006.0. This observation does not require on-board aquisition. A pointing accuracy of 2" is sufficient.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) PSRJ0437-4715	ACS/SBC, ACCUM, SBC	PR130L		POS TARG 0,-4.5;		1600.0 Secs	
						SHADOW		*[==>]*	***[1]***
Comments: This is 1st spectroscopic exposure taken with the SHADOW requirement. It should be followed (or preceded) by the imaging exposure taken outside the SHADOW during the same orbit.									
2		(1) PSRJ0437-4715	ACS/SBC, ACCUM, SBC	F140LP		POS TARG 0,-4.5		850.0 Secs	
								[==>]	***[1]***
Comments: This is 1st imaging exposure taken outside the SHADOW. It should follow (or precede) the 1st spectroscopic exposure taken within the SHADOW during the same orbit. We require the direct image to be c entered at the same position on the detector as the prism image.									
3		(1) PSRJ0437-4715	ACS/SBC, ACCUM, SBC	PR130L		POS TARG 0,-4.5;		1600.0 Secs	
						SHADOW		*[==>]*	***[2]***
Comments: This is 2nd spectroscopic exposure taken with the SHADOW requirement. It should be followed (or preceded) by the imaging exposure taken outside the SHADOW during the same orbit.									
4		(1) PSRJ0437-4715	ACS/SBC, ACCUM, SBC	F140LP		POS TARG 0,-4.5		850.0 Secs	
								[==>]	***[2]***
Comments: This is 2nd imaging exposure taken outside the SHADOW. It should follow (or precede) the 2nd spectroscopic exposure taken within the SHADOW during the same orbit. We require the direct image to be centered at the same position on the detector as the prism image.									
5		(1) PSRJ0437-4715	ACS/SBC, ACCUM, SBC	PR130L		POS TARG 0,-4.5;		1600.0 Secs	
						SHADOW		*[==>]*	***[3]***
Comments: This is 3rd spectroscopic exposure taken with the SHADOW requirement. It should be followed (or preceded) by the imaging exposure taken outside the SHADOW during the same orbit.									
6		(1) PSRJ0437-4715	ACS/SBC, ACCUM, SBC	F140LP		POS TARG 0,-4.5		850.0 Secs	
								[==>]	***[3]***
Comments: This is 3rd imaging exposure taken outside the SHADOW. It should follow (or precede) the 3rd spectroscopic exposure taken within the SHADOW during the same orbit. We require the direct image to be centered at the same position on the detector as the prism image.									


Orbit Structure
Orbit 1
Server Version: 20060322
Pointing Maneuver
Pointing Maneuver
Exp. 2
Unused Visibility = 1
GS Acq
Exp. 1
Shadow Limit
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec
Orbit 2
Server Version: 20060322
Pointing Maneuver
Pointing Maneuver
Exp. 4
Unused Visibility = 1
GS Reacq
Exp. 3
Shadow Limit
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec


Orbit Structure (continued)
Orbit 3
Server Version: 20060322
Pointing Maneuver
Exp. 6
Unused Visibility = 24
GS Reacq
Exp. 5
Shadow Limit
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 10568, Visit 05 Tue Apr 25 15:25:31 GMT 2006

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/SBC

Special Requirements: ORIENT 110.0D TO 320.0 D

Comments: FUV spectroscopy with SBC and PR1300L. The ORIENT is restricted to avoid a potentially bright nearby galaxy. We apply POS TARG Y-OFFSET=-4.5" to reduce the impact of the SBC thermal glow.

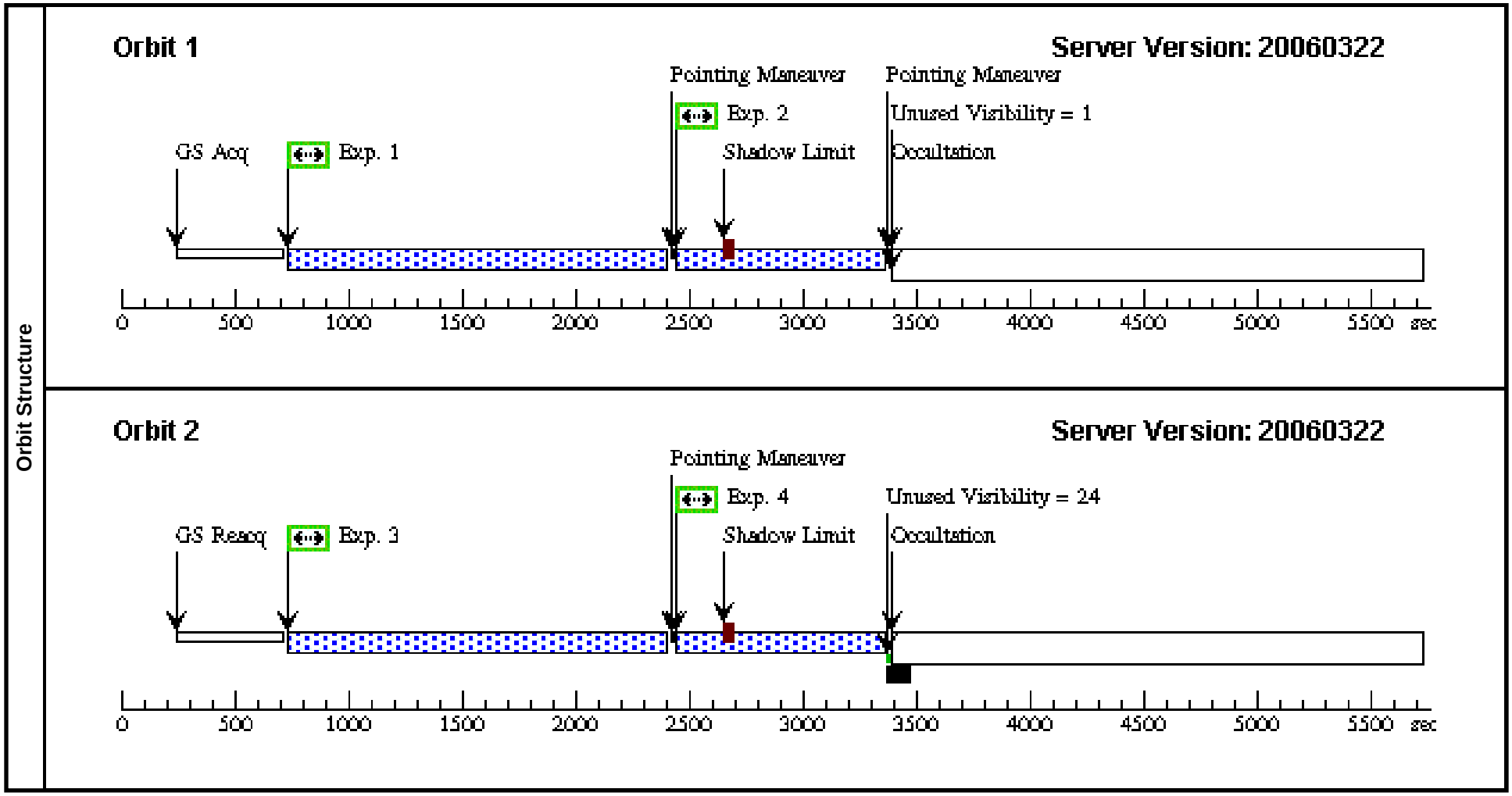
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	PSRJ0437-4715	RA: 04 37 15.8400 (69.3160000d)		V=20.9+/-0.1	Coordinate Source: HST_IMAGE
		Dec: -47 15 8.63 (-47.25240d)		B-V=1.2+/-0.1,	
		Equinox: J2000		R=20.1+/-0.1,	
		Plate Id: 03C1		I=19.4+/-0.1	

Comments: This binary pulsar has a proper motion (+121,-71) mas/yr. The position has been measured from the HST STIS/CCD image of 2001.65 and computed for 2006.0. This observation does not require on-board aquisition. A pointing accuracy of 2" is sufficient.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) PSRJ0437-4715	ACS/SBC, ACCUM, SBC	PR130L		POS TARG 0,-4.5;		1600.0 Secs	
						SHADOW		*[==>]*	***[1]***
Comments: This is 1st spectroscopic exposure taken with the SHADOW requirement. It should be followed (or preceded) by the imaging exposure taken outside the SHADOW during the same orbit.									
2		(1) PSRJ0437-4715	ACS/SBC, ACCUM, SBC	F140LP		POS TARG 0,-4.5		850.0 Secs	
								[==>]	***[1]***
Comments: This is 1st imaging exposure taken outside the SHADOW. It should follow (or precede) the 1st spectroscopic exposure taken within the SHADOW during the same orbit. We require the direct image to be c entered at the same position on the detector as the prism image.									
3		(1) PSRJ0437-4715	ACS/SBC, ACCUM, SBC	PR130L		POS TARG 0,-4.5;		1600.0 Secs	
						SHADOW		*[==>]*	***[2]***
Comments: This is 2nd spectroscopic exposure taken with the SHADOW requirement. It should be followed (or preceded) by the imaging exposure taken outside the SHADOW during the same orbit.									
4		(1) PSRJ0437-4715	ACS/SBC, ACCUM, SBC	F140LP		POS TARG 0,-4.5		850.0 Secs	
								[==>]	***[2]***
Comments: This is 2nd imaging exposure taken outside the SHADOW. It should follow (or precede) the 2nd spectroscopic exposure taken within the SHADOW during the same orbit. We require the direct image to be centered at the same position on the detector as the prism image.									


Orbit Structure
Orbit 1
Server Version: 20060322
Pointing Maneuver
Pointing Maneuver
Exp. 2
Unused Visibility = 1
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Shadow Limit
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec
Orbit 2
Server Version: 20060322
Pointing Maneuver
Exp. 4
Unused Visibility = 24
GS Reacq
Exp. 3
Shadow Limit
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec