12554 - The Origins of Carbon-Enhanced Metal-Poor Stars

Cycle: 19, 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	(2) HD196944	STIS/CCD STIS/NUV-MAMA	3	05-Jul-2011 21:27:28.0	yes
02	(3) HD201626	STIS/CCD STIS/NUV-MAMA	3	05-Jul-2011 21:27:36.0	yes
03	(1) BD+440493	STIS/CCD STIS/NUV-MAMA	4	05-Jul-2011 21:27:47.0	yes
04	(1) BD+440493	STIS/CCD STIS/NUV-MAMA	4	05-Jul-2011 21:27:56.0	yes

14 Total Orbits Used

ABSTRACT

We propose to measure abundances of light and heavy neutron-capture elements for six of the brightest examples of carbon-enhanced metal-poor (CEMP) stars, in order to provide the data needed to directly test models for the origin of these stars in the early Galaxy. CEMP stars are recognized as important tracers of Galactic chemical evolution at metallicities [Fe/H] < -2.0, where they account for on the order of 20% of all stars, rising to 40% below [Fe/H] = -3.5, and 100% below [Fe/H] = -4.0. Detailed understanding of their astrophysical origin has been limited by the lack of a complete inventory of their neutron-capture elements, which are required to probe the nucleosynthetic processes involved in producing their distinctive abundance patterns. Our targets span the known range of neutron-capture element variations associated with CEMP stars (3 stars with pure s-process enhancements, 2 stars with evidence of both r-process and s-process enhancements, and 1 star with low abundances of neutron-capture elements). Each class may well be associated with different progenitor objects, including the first AGB stars in the Galaxy, "faint supernovae" undergoing mixing and fallback, or even the winds from massive, rapidly rotating stars with [Fe/H] < -6.0. A more complete set of neutron-capture elements will provide tight constraints on these nucleosynthetic and evolutionary models, including the necessary ingredients for understanding the structure and evolution of the first AGB stars in the Galaxy, and shed light on the transition phase from SNII as major C-producers in the early Universe to AGB stars being the major C-producers at later times.

OBSERVING DESCRIPTION

We will use STIS (NUV-MAMA detectors, E230M grating) to observe three carbon enhanced metal-poor (CEMP) stars. These stars are the brightest representatives of the CEMP-s, CEMP-r/s, and CEMP-no classes. All three target stars have been chosen on the basis of abundances derived from high-quality ground-based optical spectra and the stars' relative brightness.

The transitions of interest are spaced over a wide wavelength range of the near-UV (2282 to 3058 Angstroms). Our target S/N (~40/1 per resolution element in the continuum near 2833 Angstroms) is based on our line strength predictions for typical features of interest (specifically, Pb I 2833). We have estimated integration times using the current version of the STIS exposure time calculator for our setup based on Kurucz models of the flux distribution for our 3 target stars. We plan an ACQ and ACQ/PEAK image at the beginning of all visits, and another ACQ/PEAK image in the middle of visits lasting longer than 3 orbits. Otherwise, the obseving strategy is straightforward: spend as much time as possible observing these stars in one echelle mode to acquire as much S/N as possible.

ADDITIONAL COMMENTS

Finding charts checked to confirm that predicted star positions at epoch of DSS image perfectly align with the diffraction spikes. -iur, 30jun2011
(To do this: click on the "Targets", "Fixed Targets", [starname], then "File" --> "Export" --> "Export Target Confirmation Charts")

Visit

Proposal 12554, Visit 01 Wed Jul 06 01:28:01 GMT 2011

Diagnostic Status: No Diagnostics

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

Special Requirements: (none)

Comments: HD196944 - visit 1 of 1

Fixed Targets

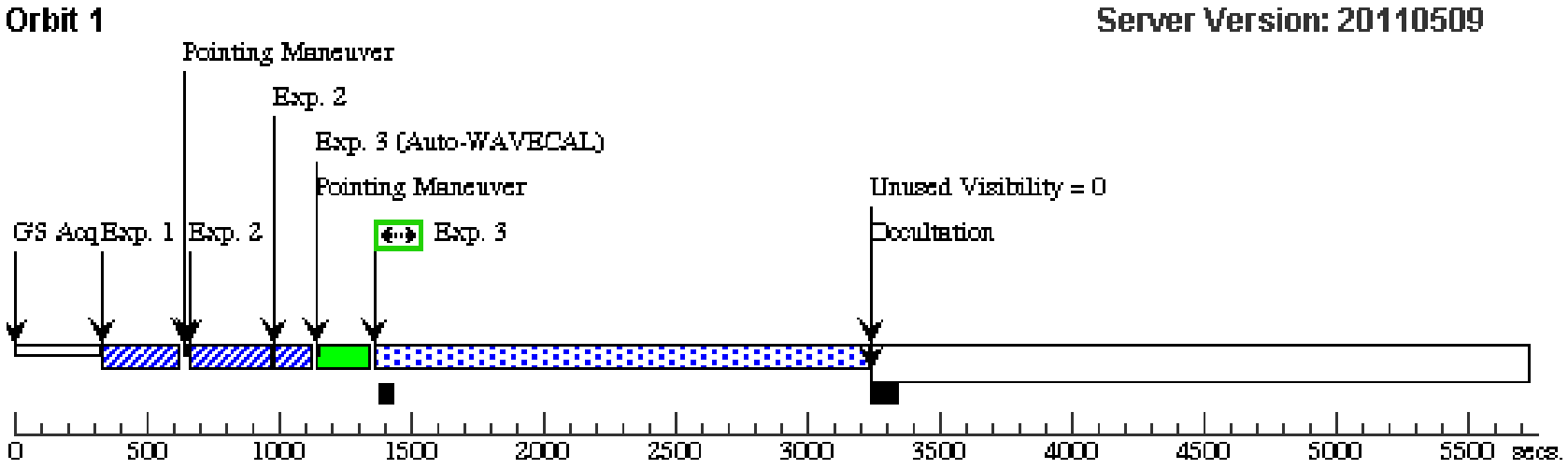
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	HD196944	RA: 20 40 46.0857 (310.1920238d) Dec: -06 47 50.65 (-6.79740d) Equinox: J2000	Proper Motion RA: 41.88 mas/yr Proper Motion Dec: -27.45 mas/yr Parallax: 0.00205" Epoch of Position: 2000.0 Radial Velocity: -174. km/sec	V=8.41+/-0.03	Reference Frame: ICRS

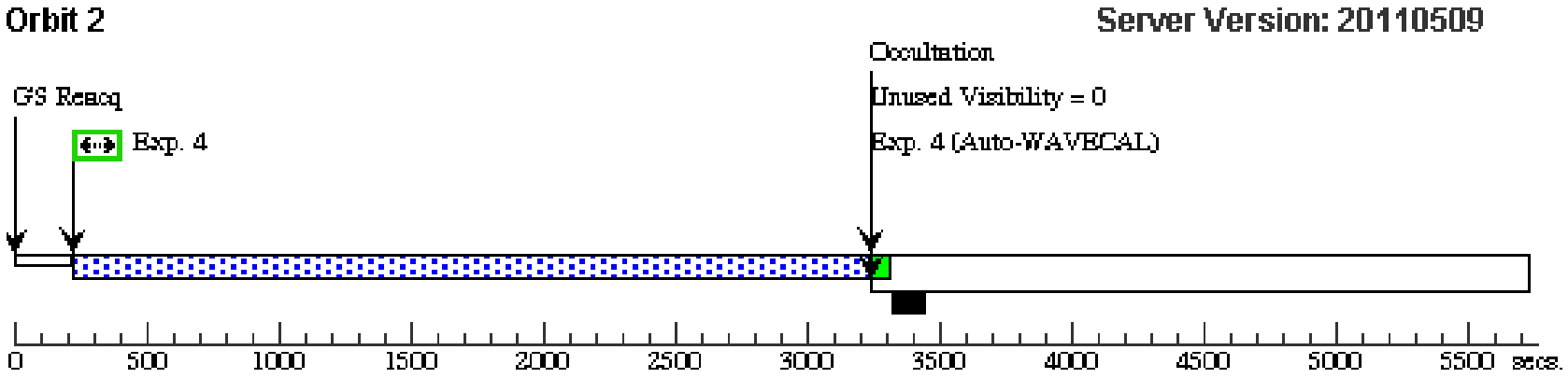
Comments: Coordinates, PM, parallax, and RV taken from SIMBAD using the values from the 2007 Hipparcos re-reduction. -iur, 30jun2011

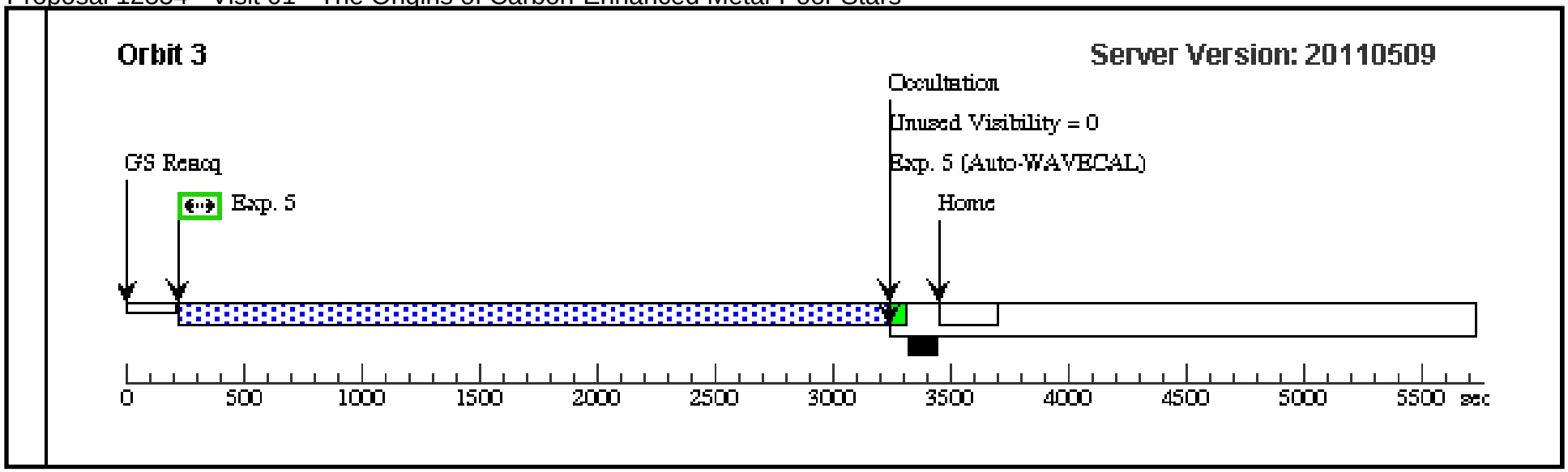
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	HD196944 - 1 - ACQ	(2) HD196944	STIS/CCD, ACQ, F25ND3	MIRROR				1.0 Secs *[==>]*	***[1]***
2	HD196944 - 1 - ACQ/PEAK	(2) HD196944	STIS/CCD, ACQ/PEAK, 0.2X0.05ND	MIRROR				1.0 Secs *[==>]*	***[1]***
3	HD196944 - 1 - science1 (STIS.sp.184469)	(2) HD196944	STIS/NUV-MAMA, ACCUM, 0.2X0.06	E230M 2707 A				2160 Secs *[==>1852.0 Secs]*	***[1]***
4	HD196944 - 1 - science2 (STIS.sp.184469)	(2) HD196944	STIS/NUV-MAMA, ACCUM, 0.2X0.06	E230M 2707 A				3000 Secs *[==>2990.0 Secs]*	***[2]***
5	HD196944 - 1 - science3 (STIS.sp.184469)	(2) HD196944	STIS/NUV-MAMA, ACCUM, 0.2X0.06	E230M 2707 A				3000 Secs *[==>2990.0 Secs]*	***[3]***

Orbit Structure



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Visit

Proposal 12554, Visit 02 Wed Jul 06 01:28:03 GMT 2011

Diagnostic Status: No Diagnostics

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

Special Requirements: (none)

Comments: HD201626 - visit1 of 1

Fixed Targets

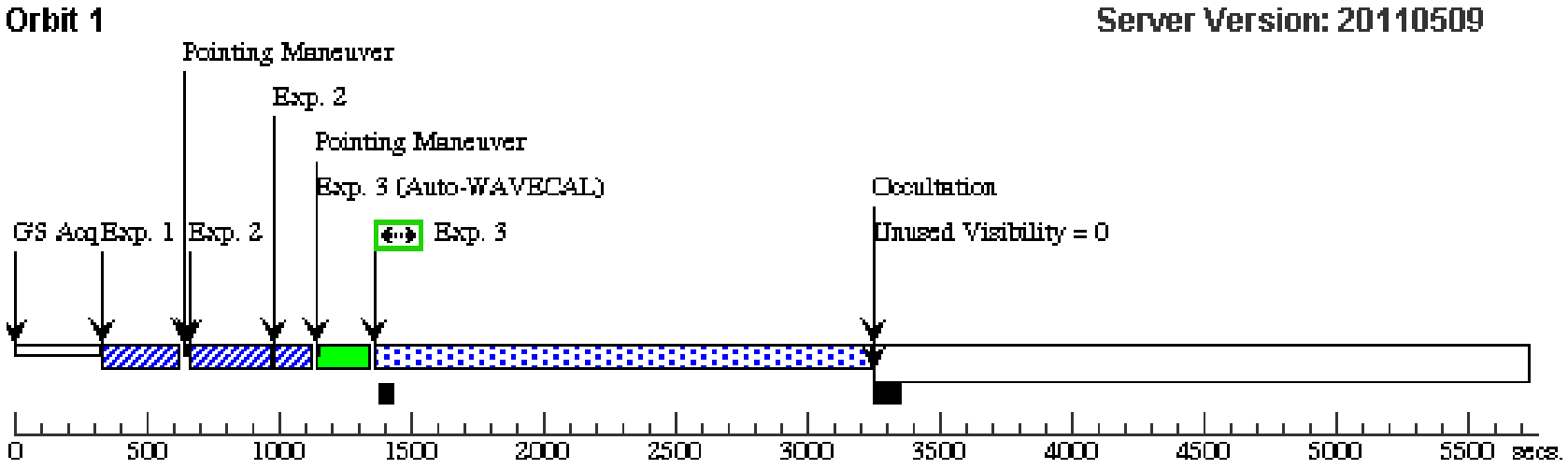
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	HD201626	RA: 21 09 59.2724 (317.4969683d) Dec: +26 36 54.93 (26.61526d) Equinox: J2000	Proper Motion RA: -41.45 mas/yr Proper Motion Dec: 30.22 mas/yr Parallax: 0.00442" Epoch of Position: 2000.0 Radial Velocity: -145. km/sec	V=8.13+/-0.03	Reference Frame: ICRS

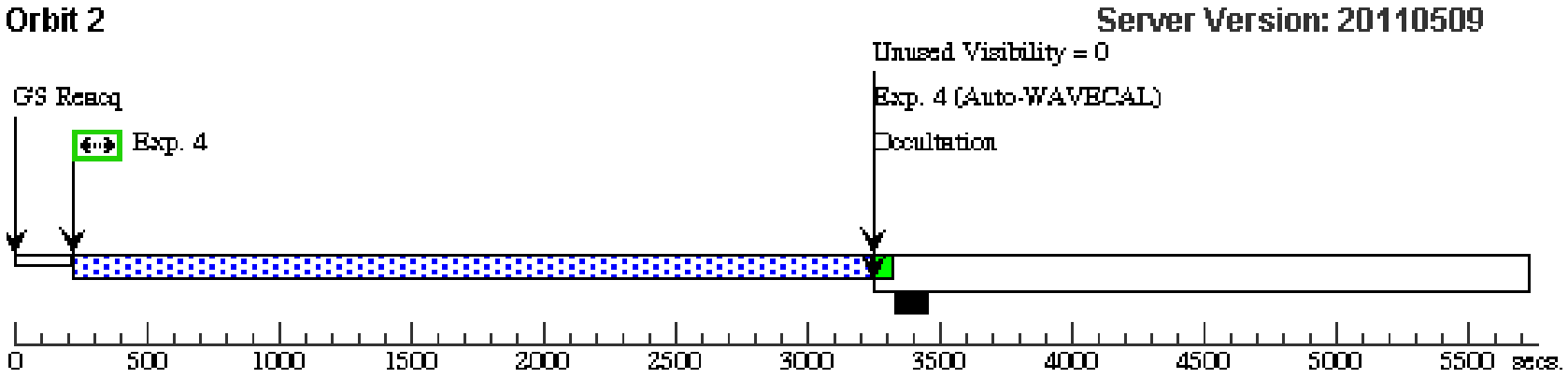
Comments: Coordinates, PM, parallax, and RV taken from SIMBAD using the values from the 2007 Hipparcos re-reduction. -iur, 30jun2011

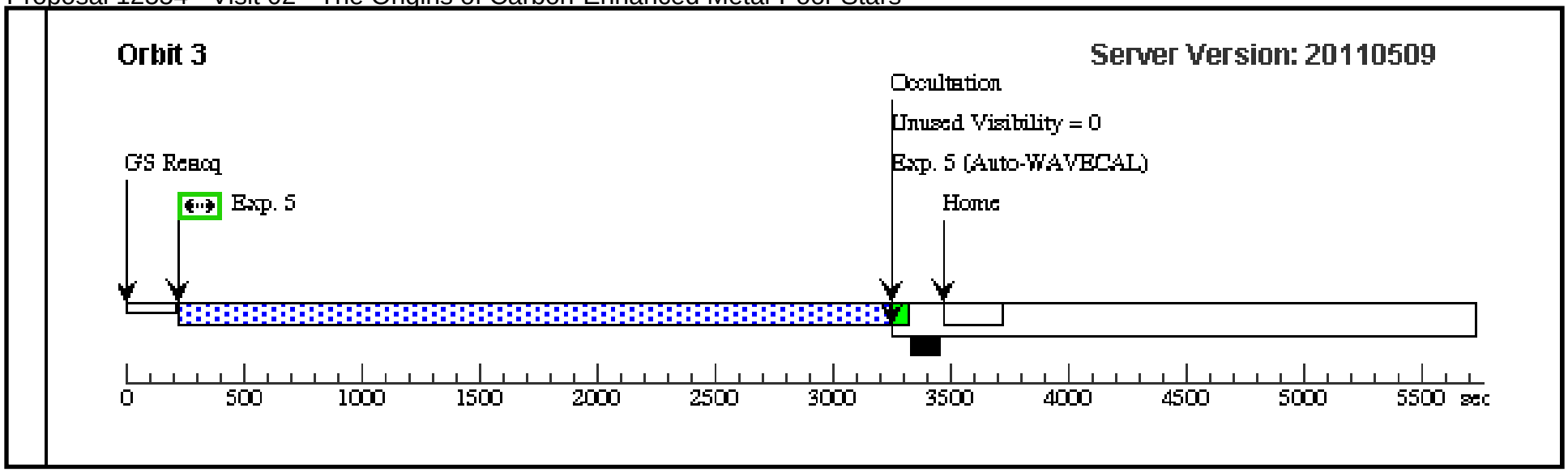
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	HD201626 - 1 - ACQ	(3) HD201626	STIS/CCD, ACQ, F25ND3	MIRROR				1.0 Secs *[==>]*	***[1]***
2	HD201626 - 1 - ACQ/PEAK	(3) HD201626	STIS/CCD, ACQ/PEAK, 0.2X0.05ND	MIRROR				1.0 Secs *[==>]*	***[1]***
3	HD201626 - 1 - science1 (STIS.sp.184472)	(3) HD201626	STIS/NUV-MAMA, ACCUM, 0.2X0.06	E230M 2707 A				2160 Secs *[==>1867.0 Secs]*	***[1]***
4	HD201626 - 1 - science2 (STIS.sp.184472)	(3) HD201626	STIS/NUV-MAMA, ACCUM, 0.2X0.06	E230M 2707 A				3100 Secs *[==>3005.0 Secs]*	***[2]***
5	HD201626 - 1 - science3 (STIS.sp.184472)	(3) HD201626	STIS/NUV-MAMA, ACCUM, 0.2X0.06	E230M 2707 A				3100 Secs *[==>3005.0 Secs]*	***[3]***

Orbit Structure



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Visit

Proposal 12554, Visit 03 Wed Jul 06 01:28:04 GMT 2011

Diagnostic Status: No Diagnostics

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

Special Requirements: (none)

Comments: BD+440493 - visit 1 of 2

Fixed Targets

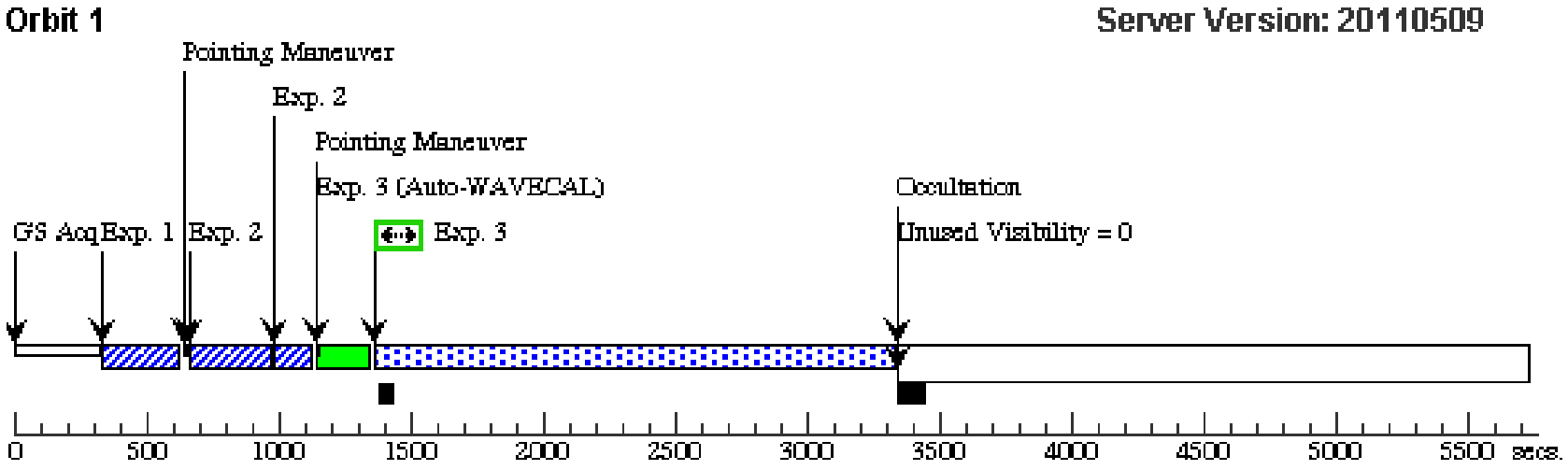
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	BD+440493	RA: 02 26 49.7381 (36.7072421d) Dec: +44 57 46.52 (44.96292d) Equinox: J2000	Proper Motion RA: 117.03 mas/yr Proper Motion Dec: -33.12 mas/yr Parallax: 0.00488" Epoch of Position: 2000 Radial Velocity: -151. km/sec	V=9.13+/-0.05	Reference Frame: ICRS

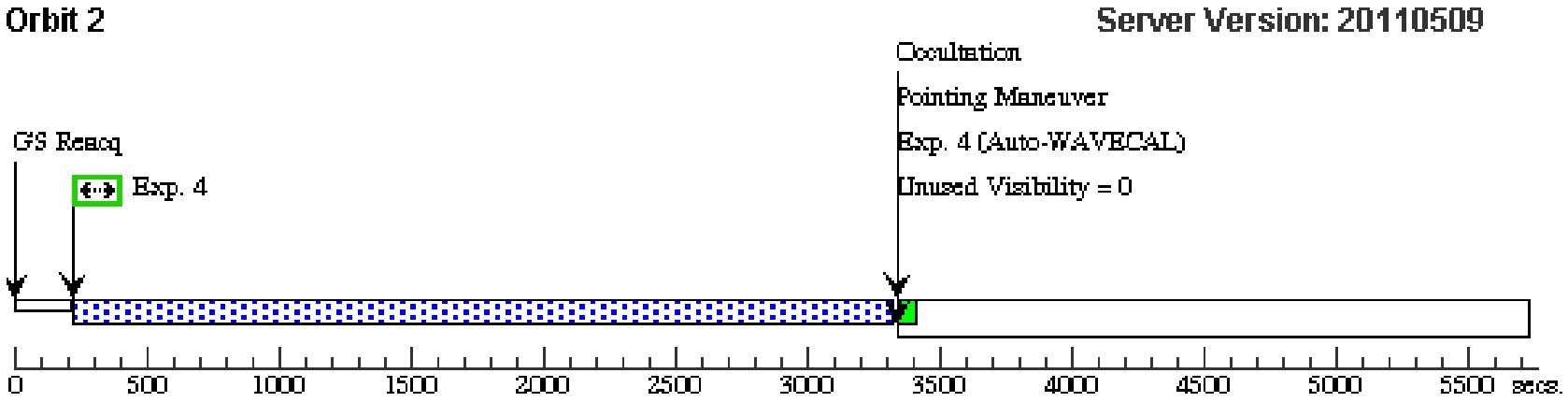
Comments: Coordinates, PM, parallax, and RV taken from SIMBAD using the values from the 2007 Hipparcos re-reduction. -iur, 30jun2011

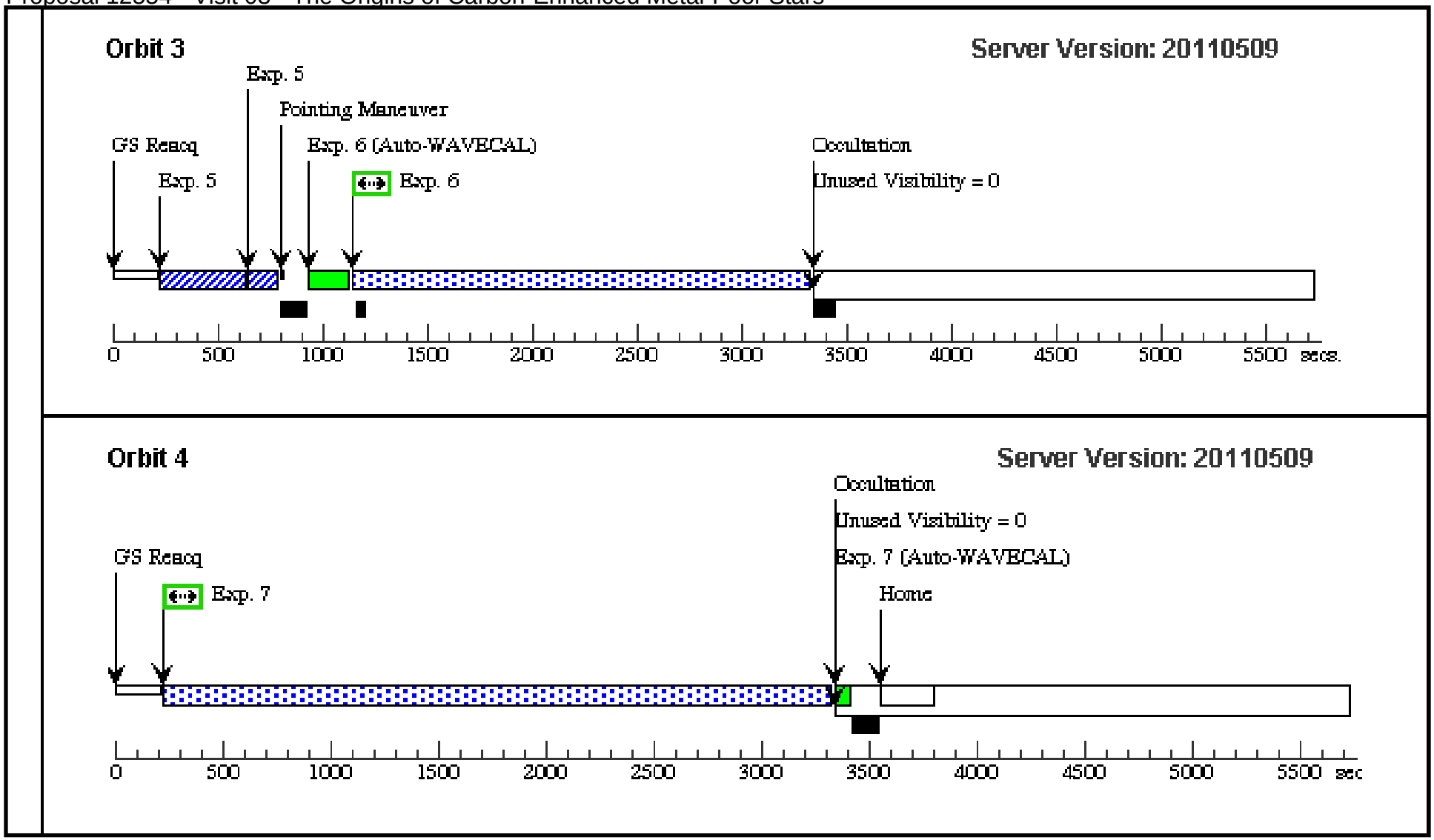
Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	BD+440493 - 1 - ACQ	(1) BD+440493	STIS/CCD, ACQ, F25ND3	MIRROR				1.0 Secs *[==>]*	 ***[1]***
2	BD+440493 - 1 - ACQ/PEAK	(1) BD+440493	STIS/CCD, ACQ/PEAK, 0.2X0.05ND	MIRROR				1.0 Secs *[==>]*	 ***[1]***
3	BD+440493 - 1 - science 1 (STIS.sp.184473)	(1) BD+440493	STIS/NUV-MAMA, ACCUM, 0.2X0.06	E230M 2707 A				2160 Secs *[==>1951.0 Secs]*	 ***[1]***
4	BD+440493 - 1 - science 2 (STIS.sp.184473)	(1) BD+440493	STIS/NUV-MAMA, ACCUM, 0.2X0.06	E230M 2707 A				3000 Secs *[==>3089.0 Secs]*	 ***[2]***
5	BD+440493 - 1 - ACQ/PEAK	(1) BD+440493	STIS/CCD, ACQ/PEAK, 0.2X0.05ND	MIRROR				1.0 Secs *[==>]*	 ***[3]***
6	BD+440493 - 1 - science 3 (STIS.sp.184473)	(1) BD+440493	STIS/NUV-MAMA, ACCUM, 0.2X0.06	E230M 2707 A				2640 Secs *[==>2168.0 Secs]*	 ***[3]***
7	BD+440493 - 1 - science 4 (STIS.sp.184473)	(1) BD+440493	STIS/NUV-MAMA, ACCUM, 0.2X0.06	E230M 2707 A				3000 Secs *[==>3089.0 Secs]*	 ***[4]***

Orbit Structure



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Occultation
Exp. 5
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secs.
Orbit 4
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Occultation
Unused Visibility = 0
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sec

Visit

Proposal 12554, Visit 04 Wed Jul 06 01:28:05 GMT 2011

Diagnostic Status: No Diagnostics

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

Special Requirements: (none)

Comments: BD+440493 - visit 2 of 2

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	BD+440493	RA: 02 26 49.7381 (36.7072421d) Dec: +44 57 46.52 (44.96292d) Equinox: J2000	Proper Motion RA: 117.03 mas/yr Proper Motion Dec: -33.12 mas/yr Parallax: 0.00488" Epoch of Position: 2000 Radial Velocity: -151. km/sec	V=9.13+/-0.05	Reference Frame: ICRS

Comments: Coordinates, PM, parallax, and RV taken from SIMBAD using the values from the 2007 Hipparcos re-reduction. -iur, 30jun2011

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	BD+440493 - 2 - ACQ	(1) BD+440493	STIS/CCD, ACQ, F25ND3	MIRROR				1.0 Secs *[==>]*	 ***[1]***
2	BD+440493 - 2 - ACQ/PEAK	(1) BD+440493	STIS/CCD, ACQ/PEAK, 0.2X0.05ND	MIRROR				1.0 Secs *[==>]*	 ***[1]***
3	BD+440493 - 2 - science 1 (STIS.sp.184473)	(1) BD+440493	STIS/NUV-MAMA, ACCUM, 0.2X0.06	E230M 2707 A				2160 Secs *[==>1951.0 Secs]*	 ***[1]***
4	BD+440493 - 2 - science 2 (STIS.sp.184473)	(1) BD+440493	STIS/NUV-MAMA, ACCUM, 0.2X0.06	E230M 2707 A				3000 Secs *[==>3089.0 Secs]*	 ***[2]***
5	BD+440493 - 2 - ACQ/PEAK	(1) BD+440493	STIS/CCD, ACQ/PEAK, 0.2X0.05ND	MIRROR				1.0 Secs *[==>]*	 ***[3]***
6	BD+440493 - 2 - science 3 (STIS.sp.184473)	(1) BD+440493	STIS/NUV-MAMA, ACCUM, 0.2X0.06	E230M 2707 A				2640 Secs *[==>2168.0 Secs]*	 ***[3]***
7	BD+440493 - 2 - science 4 (STIS.sp.184473)	(1) BD+440493	STIS/NUV-MAMA, ACCUM, 0.2X0.06	E230M 2707 A				3000 Secs *[==>3089.0 Secs]*	 ***[4]***

Orbit Structure

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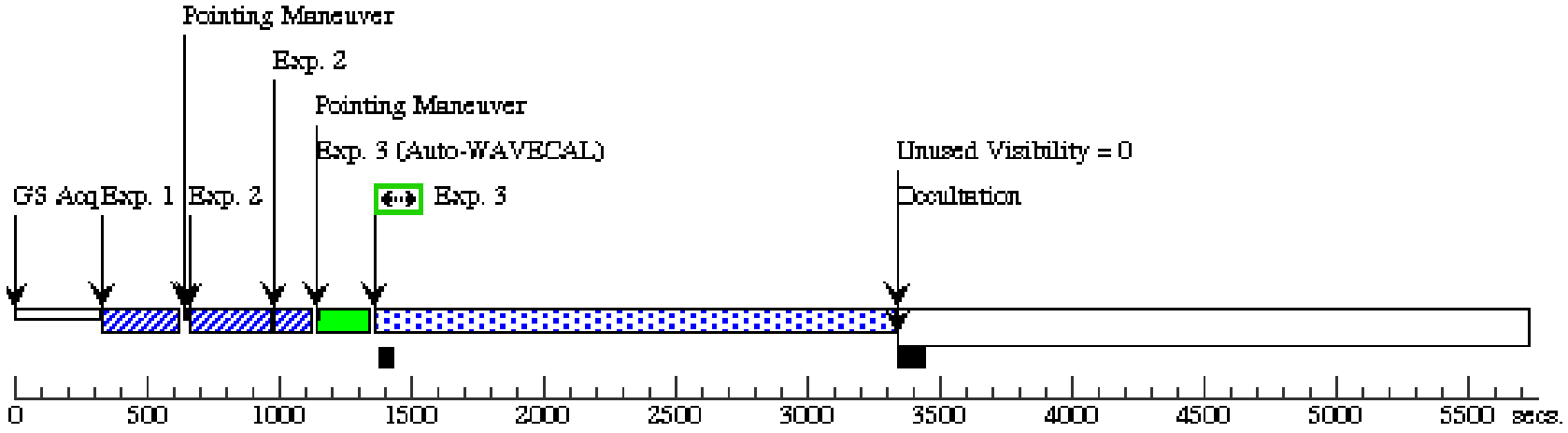
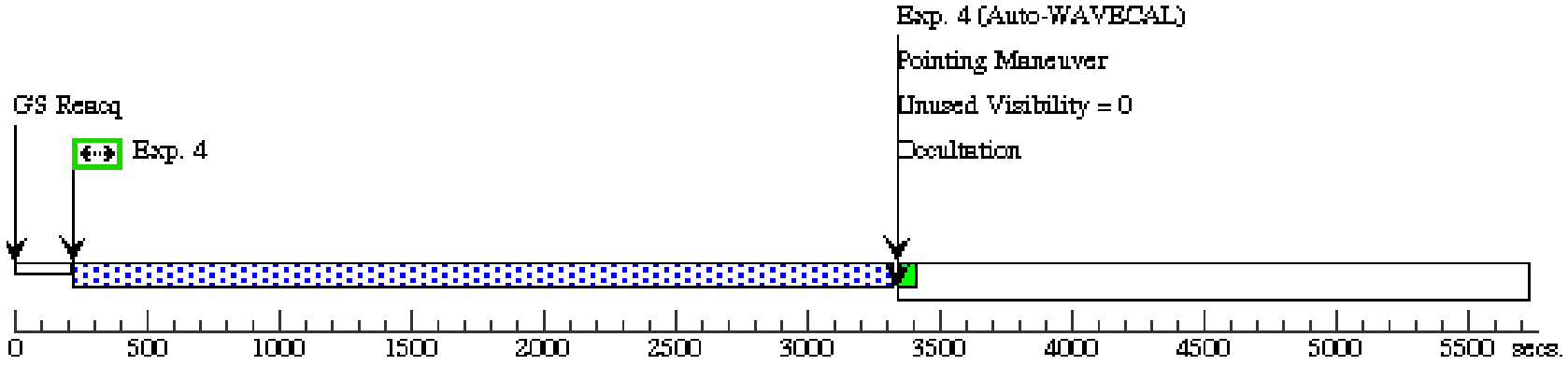
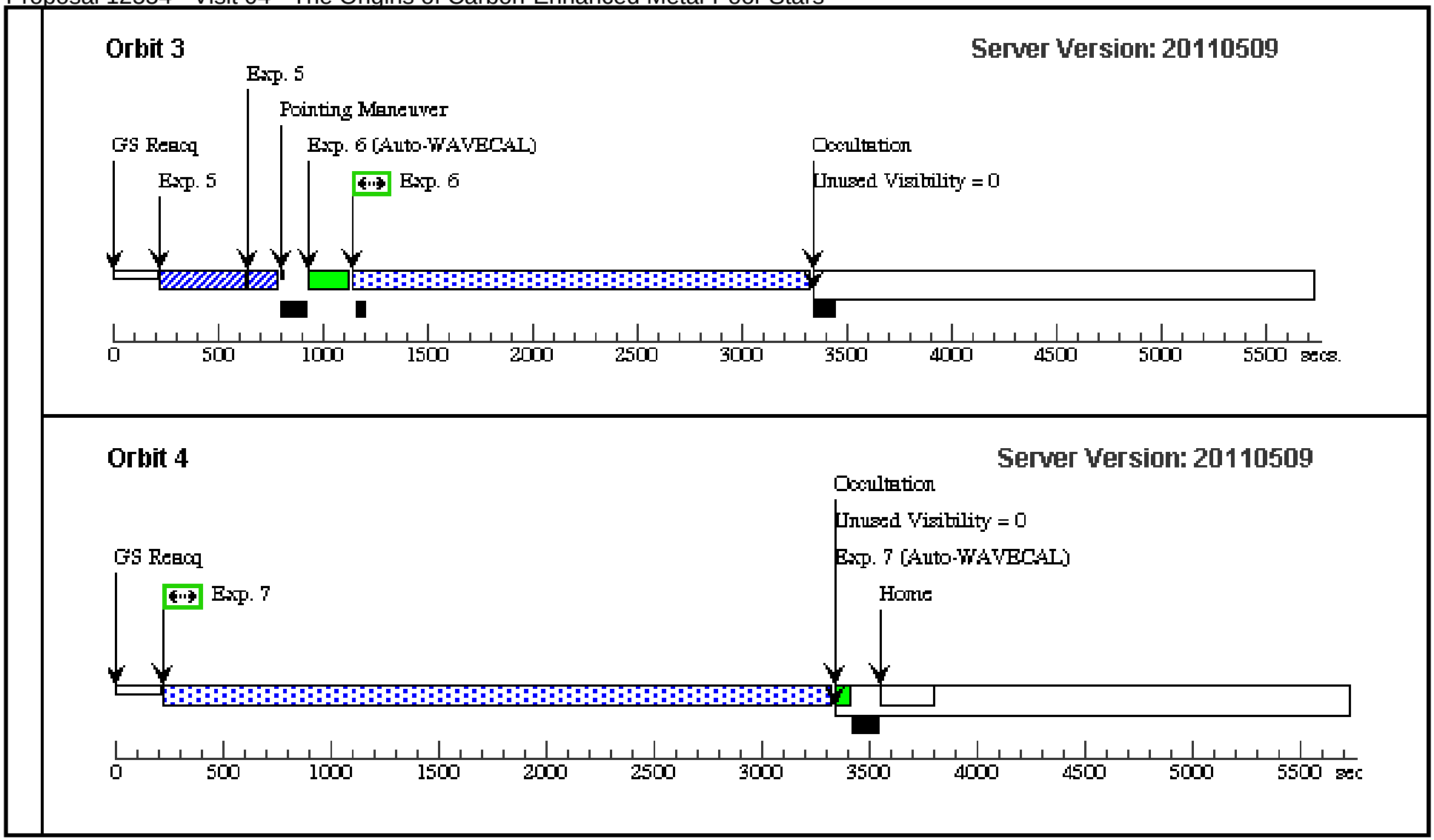
Server Version: 20110509



Orbit 2

Server Version: 20110509




Orbit 3
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Pointing Maneuver
GS Reacq
Exp. 6 (Auto-WAVECAL)
Occultation
Exp. 5
Exp. 6
Unused Visibility = 0
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secs.
Orbit 4
Server Version: 20110509
Occultation
Unused Visibility = 0
GS Reacq
Exp. 7 (Auto-WAVECAL)
Exp. 7
Home
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sec