12179 - The Stellar Winds of Evolved, Braked O-Type Magnetic Oblique Rotators

Cycle: 18, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Dr. Jean-Claude Bouret (PI) (ESA Member)	**CNRS, Laboratoire d'Astrophysique de Marseille**	**jean-claude.bouret@oamp.fr**
Dr. Nolan R. Walborn (CoI) (AdminUSPI) (Contact)	Space Telescope Science Institute	walborn@stsci.edu
Dr. Fabrice Martins (CoI) (ESA Member)	Universite de Montepellier II	fabrice.martins@graal.univ-montp2.fr
Dr. Yael Naze (CoI) (ESA Member)	Universite de Liege	naze@astro.ulg.ac.be
Dr. Ian D. Howarth (CoI) (ESA Member)	University College London	idh@star.ucl.ac.uk
Dr. Alexander W. Fullerton (CoI)	Space Telescope Science Institute	fullerton@stsci.edu
Dr. Gregg A. Wade (CoI)	Royal Military College of Canada	Gregg.Wade@rmc.ca
Dr. Artemio Herrero (CoI) (ESA Member)	Instituto de Astrofisica de Canarias	ahd@ll.iac.es
Dr. Wagner Marcolino (CoI) (ESA Member)	Observatorio Nacional	wagner.marcolino@oamp.fr

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) HD191612	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	1	08-Jul-2010 21:41:59.0	yes
02	(1) HD191612	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	1	08-Jul-2010 21:42:04.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
03	(1) HD191612	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	1	08-Jul-2010 21:42:08.0	yes
04	(1) HD191612	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	1	08-Jul-2010 21:42:12.0	yes
05	(2) HD108	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	1	08-Jul-2010 21:42:17.0	yes

5 Total Orbits Used

ABSTRACT

Magnetic fields have recently been discovered on several massive stars, but their origin and influence on the evolution of these stars are poorly understood. Two of these objects, HD 191612 and HD 108, are of particular interest. Very recent spectropolarimetric observations have shown that they are most likely magnetic oblique rotators, like the young O star Theta1 Ori C, whose 15d periodically variable field was found somewhat earlier. However, the two new objects are much slower rotators, unusually so for O stars, with periods of 538d and 50-60yrs, respectively, and there are other indications that they are older. They provide an opportunity to study the efficiency of wind braking of magnetic O stars through angular momentum loss. We shall perform STIS high-resolution UV spectroscopy of HD 191612 and HD 108 (phase resolved for the former) to derive more complete estimates of fundamental quantities than available from optical data alone. We shall measure the mass-loss rates from the UV wind profiles, which will constrain the extreme wind confinement of these stars and establish whether the large H-alpha emission variations are wind-related or geometrical. We shall also derive more accurate ages and stellar surface properties. In turn, these results will support a more definitive discussion of the angular momentum evolution versus the ages of HD 191612 and HD 108, and of the comparison with the younger and faster Theta1 Ori C.

OBSERVING DESCRIPTION

These are straightforward spectroscopic observations, for which the STIS E140M and E230M echelles are the configurations of choice, providing complete FUV and NUV spectral coverage at high resolution and S/N within a

single orbit. The FUV contains the high-priority stellar-wind resonance lines of N~V, Si~IV, and C~IV, as well as weaker subordinate, metastable wind lines of He~II and N~IV. The NUV adds several He absorption lines that are useful photospheric diagnostics, to compare with those in the optical.

At the declination of HD~191612, the visibility period is 55~min. Guide-star and target acquisitions consume 6~min each; no ACQ-PEAK is required with the 0.2~arcsec square aperture that we shall use. The instrument overheads are 16~min. Thus, 27~min are available for spectroscopic exposures, which is more than ample for our target and configurations. For an O8 spectral type and S/N of 40, the STIS ETC gives exposure times of 600 and 100~sec for E140M and E230M, respectively. Depending on the Phase~II overheads, we may do two exposures in each configuration to increase the data quality. Our target is safe for observation in the above configurations per the ETC.

For HD~108 the visibility period is 59~min. Acquisitions and instrument overheads are as above, except that this star is too bright for E230M with the 0.2X0.2 aperture, so we shall have to use the 0.1X0.03 that requires a two-stage peakup, adding 12~min to the overheads. Still, 19~min are left for scientific exposures, which are just 300~sec in the FUV and 100~sec in the NUV. Again, the exposure times may be increased, or two exposures obtained in each region.

Both stars are isolated from any other bright stars, so there will be no field safety concerns.

Visit

Proposal 12179, Visit 01 Fri Jul 09 01:42:22 GMT 2010

Diagnostic Status: No Diagnostics

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

Special Requirements: BETWEEN 20-AUG-2010:00:00:00 AND 26-AUG-2010:00:00:00

Fixed Targets

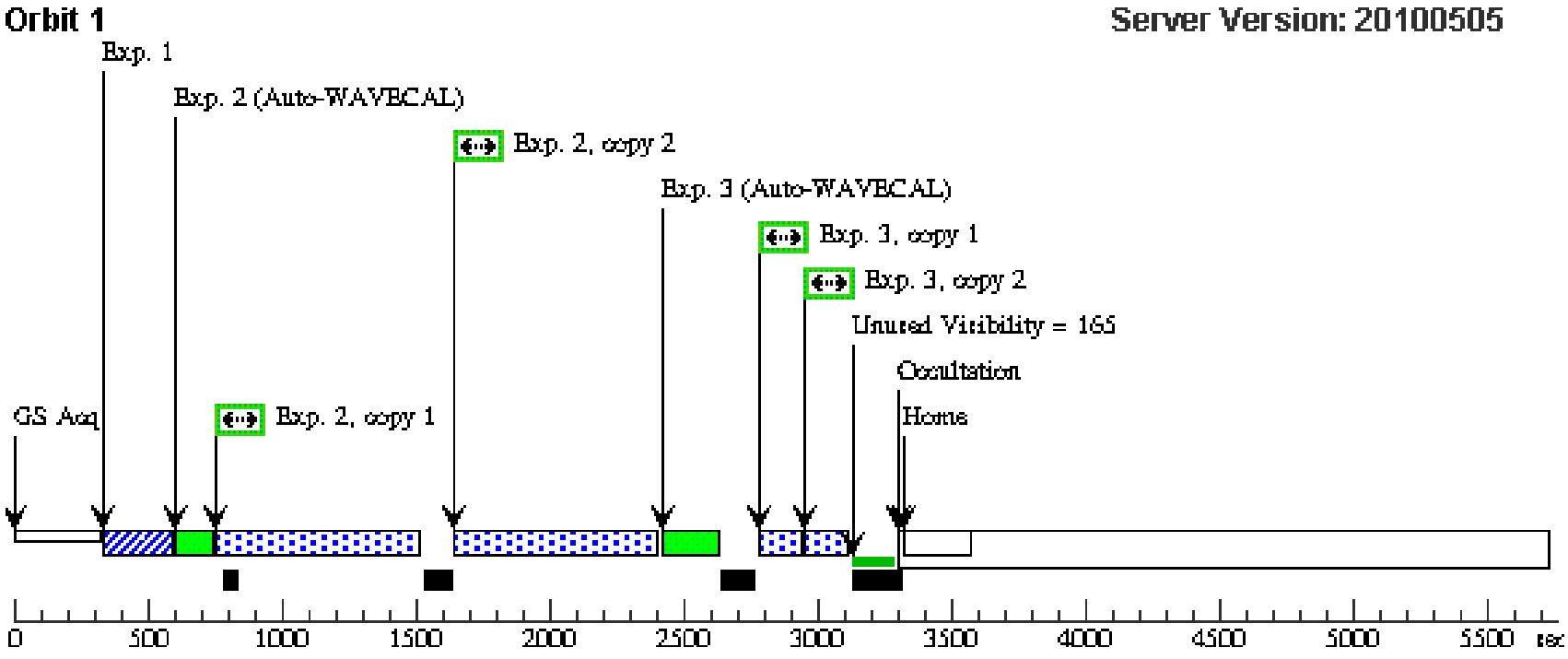
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD191612	RA: 20 09 28.6102 (302.3692092d) Dec: +35 44 1.29 (35.73369d) Equinox: J2000		V=7.78 E(B-V)=0.58, SpT=O6f?p-O8fp	Reference Frame: ICRS

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/[Actual Dur.]	Orbit
1		(1) HD191612	STIS/CCD, ACQ, F28X50OII	MIRROR				0.2 Secs *[==>]*	*[1]*
2		(1) HD191612	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				750 Secs X 2 *[==>(Copy 1)]* *[==>(Copy 2)]*	*[1]*
3		(1) HD191612	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A				150 Secs X 2 *[==>(Copy 1)]* *[==>(Copy 2)]*	*[1]*

Orbit Structure



Visit

Proposal 12179, Visit 02 Fri Jul 09 01:42:23 GMT 2010

Diagnostic Status: No Diagnostics

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

Special Requirements: BETWEEN 01-JAN-2011:00:00:00 AND 07-JAN-2011:00:00:00

Fixed Targets

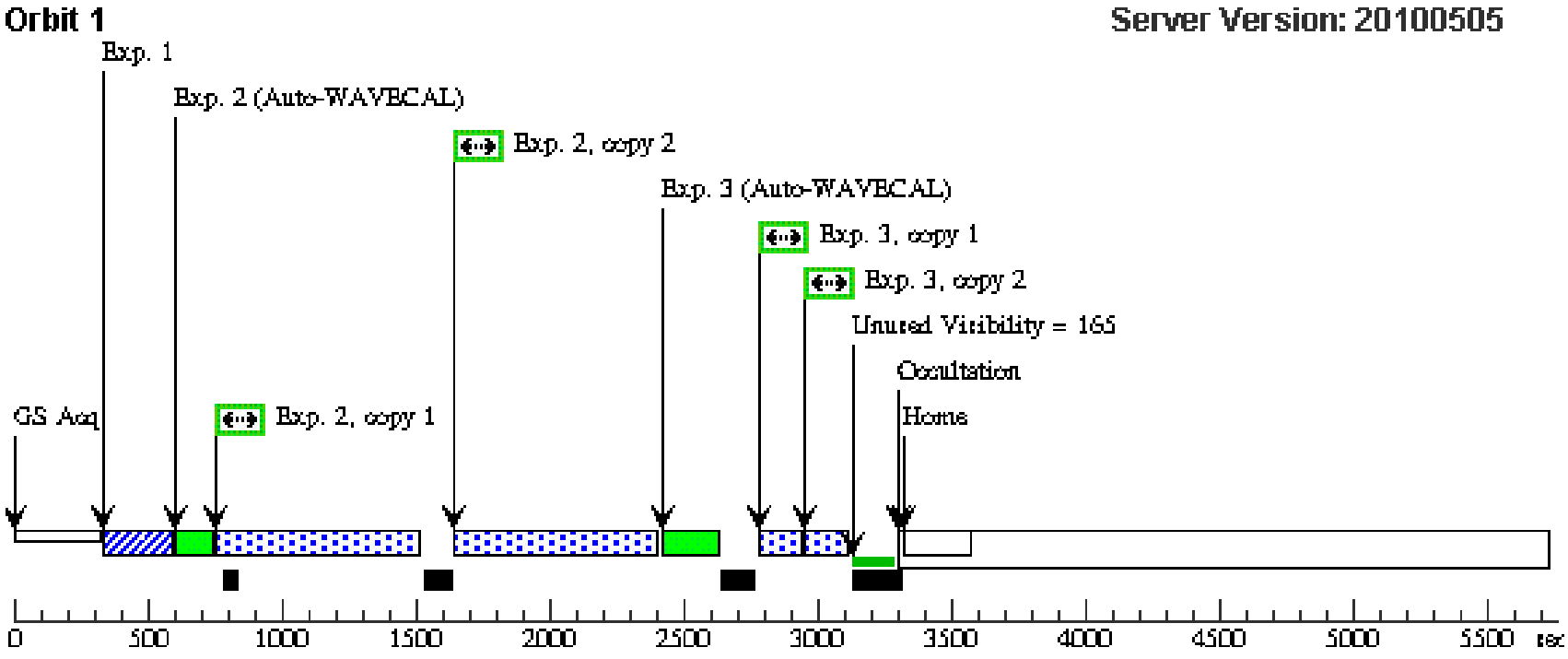
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD191612	RA: 20 09 28.6102 (302.3692092d) Dec: +35 44 1.29 (35.73369d) Equinox: J2000		V=7.78 E(B-V)=0.58, SpT=O6f?p-O8fp	Reference Frame: ICRS

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/[Actual Dur.]	Orbit
1		(1) HD191612	STIS/CCD, ACQ, F28X50OII	MIRROR				0.2 Secs *[==>]*	*[1]*
2		(1) HD191612	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				750 Secs X 2 *[==>(Copy 1)]* *[==>(Copy 2)]*	*[1]*
3		(1) HD191612	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A				150 Secs X 2 *[==>(Copy 1)]* *[==>(Copy 2)]*	*[1]*

Orbit Structure



Visit

Proposal 12179, Visit 03 Fri Jul 09 01:42:23 GMT 2010

Diagnostic Status: No Diagnostics

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

Special Requirements: BETWEEN 16-MAY-2011:00:00:00 AND 22-MAY-2011:00:00:00

Fixed Targets

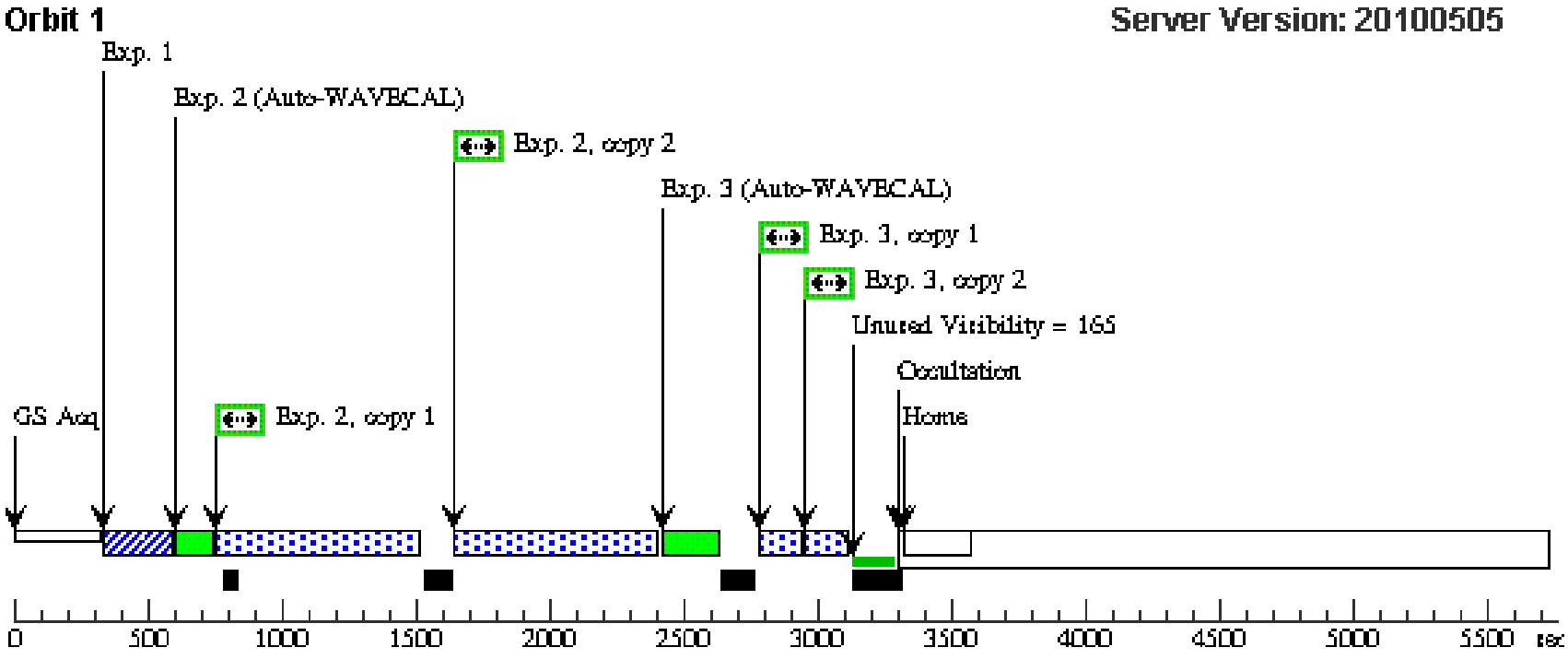
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD191612	RA: 20 09 28.6102 (302.3692092d) Dec: +35 44 1.29 (35.73369d) Equinox: J2000		V=7.78 E(B-V)=0.58, SpT=O6f?p-O8fp	Reference Frame: ICRS

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/[Actual Dur.]	Orbit
1		(1) HD191612	STIS/CCD, ACQ, F28X50OII	MIRROR				0.2 Secs	
								[==>]	***[1]***
2		(1) HD191612	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				750 Secs X 2	
								[==>(Copy 1)] *[==>(Copy 2)]*	***[1]***
3		(1) HD191612	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A				150 Secs X 2	
								[==>(Copy 1)] *[==>(Copy 2)]*	***[1]***

Orbit Structure



Visit

Proposal 12179, Visit 04 Fri Jul 09 01:42:23 GMT 2010

Diagnostic Status: No Diagnostics

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

Special Requirements: BETWEEN 27-SEP-2011:00:00:00 AND 03-OCT-2011:00:00:00

Fixed Targets

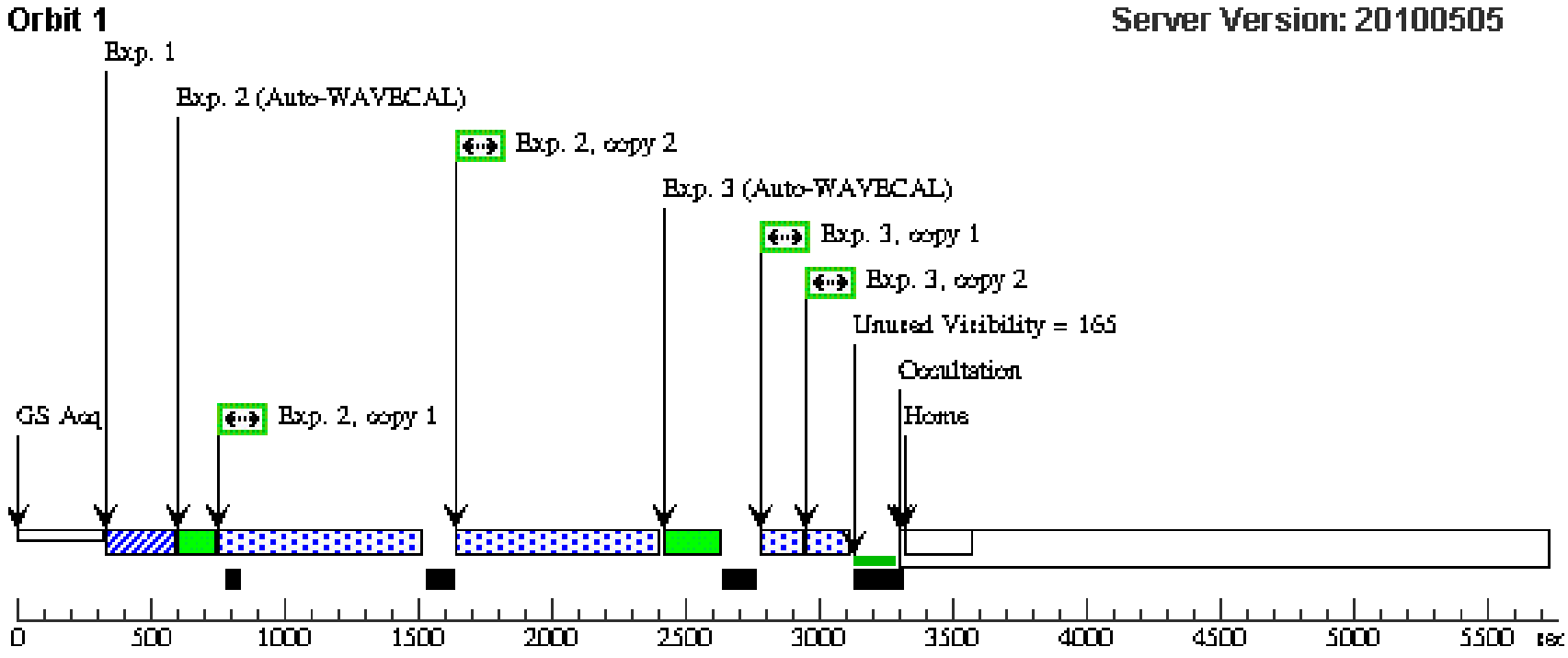
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	HD191612	RA: 20 09 28.6102 (302.3692092d) Dec: +35 44 1.29 (35.73369d) Equinox: J2000		V=7.78 E(B-V)=0.58, SpT=O6f?p-O8fp	Reference Frame: ICRS

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/[Actual Dur.]	Orbit
1		(1) HD191612	STIS/CCD, ACQ, F28X50OII	MIRROR				0.2 Secs *[==>]*	*[1]*
2		(1) HD191612	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				750 Secs X 2 *[==>(Copy 1)]* *[==>(Copy 2)]*	*[1]*
3		(1) HD191612	STIS/NUV-MAMA, ACCUM, 0.2X0.2	E230M 2707 A				150 Secs X 2 *[==>(Copy 1)]* *[==>(Copy 2)]*	*[1]*

Orbit Structure



Visit

Proposal 12179, Visit 05 Fri Jul 09 01:42:24 GMT 2010

Diagnostic Status: No Diagnostics

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

Special Requirements: (none)

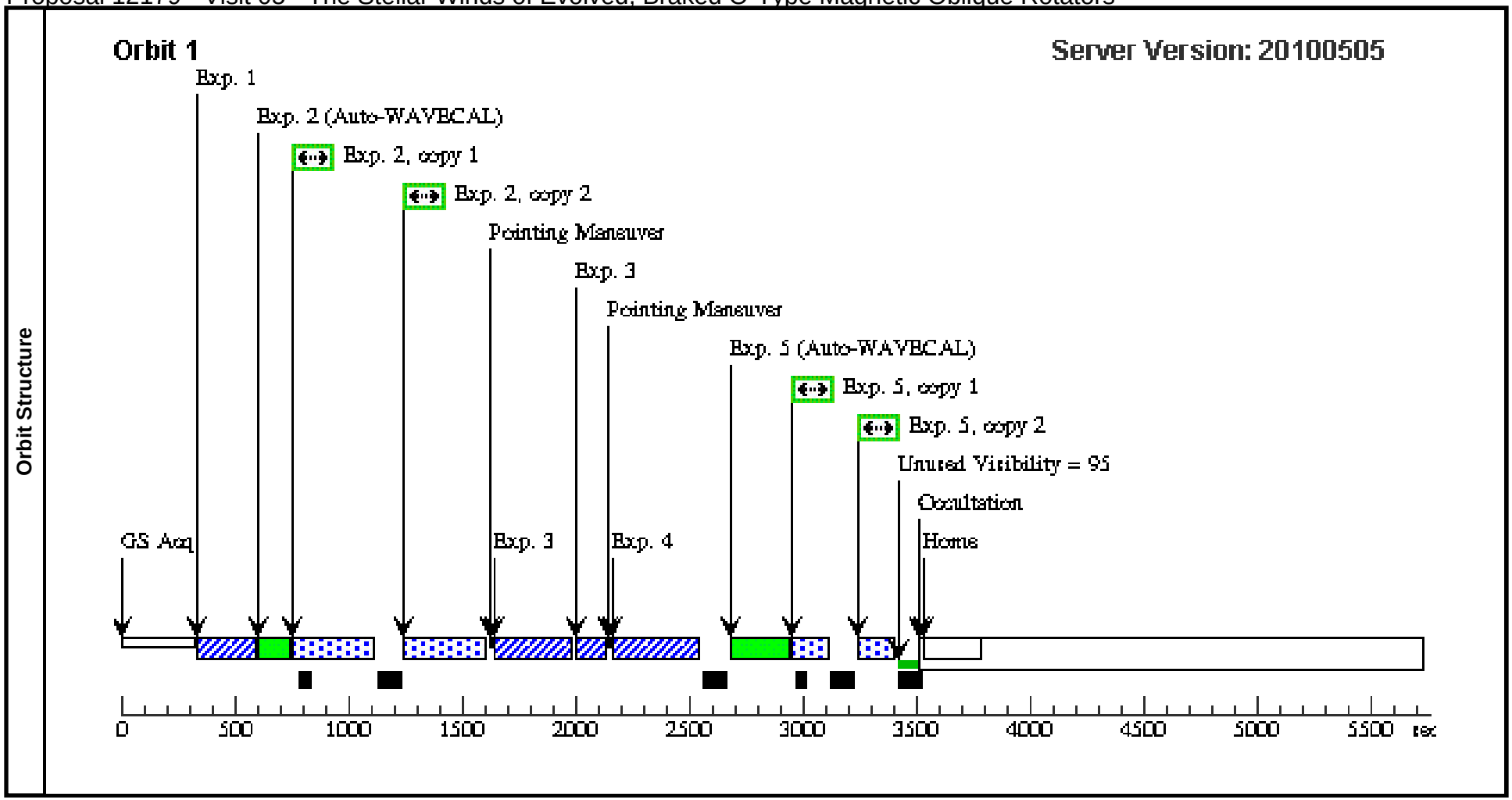
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	HD108	RA: 00 06 3.3861 (1.5141088d) Dec: +63 40 46.76 (63.67966d) Equinox: J2000		V=7.38 E(B-V)=0.49, SpT=O6f?p-O8fp	Reference Frame: ICRS

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/[Actual Dur.]	Orbit
1		(2) HD108	STIS/CCD, ACQ, F28X50OII	MIRROR				0.2 Secs	
								[==>]	***[1]***
2		(2) HD108	STIS/FUV-MAMA, ACCUM, 0.2X0.2	E140M 1425 A				350 Secs X 2	
								[==>(Copy 1)] *[==>(Copy 2)]*	***[1]***
3		(2) HD108	STIS/CCD, ACQ/PEAK, 0.2X0.09	G430M 4451 A				0.2 Secs	
								[==>]	***[1]***
4		(2) HD108	STIS/CCD, ACQ/PEAK, 0.1X0.03	G430M 4451 A				1.0 Secs	
								[==>]	***[1]***
5		(2) HD108	STIS/NUV-MAMA, ACCUM, 0.1X0.03	E230M 2707 A				150 Secs X 2	
								[==>(Copy 1)] *[==>(Copy 2)]*	***[1]***


Orbit Structure
Orbit 1
Server Version: 20100505
Exp. 1
Exp. 2 (Auto-WAVECAL)
Exp. 2, copy 1
Exp. 2, copy 2
Pointing Maneuver
Exp. 3
Pointing Maneuver
Exp. 5 (Auto-WAVECAL)
Exp. 5, copy 1
Exp. 5, copy 2
Unused Visibility = 95
Occultation
Home
GS Acq
Exp. 3
Exp. 4
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec