13719 - Accretion of planetary debris onto the unique white dwarf GD394

Cycle: 22, 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	(1) GD-394	STIS/CCD STIS/FUV-MAMA	1	15-May-2015 21:02:26.0	yes
02	(1) GD-394	STIS/CCD STIS/FUV-MAMA	1	15-May-2015 21:02:29.0	yes
03	(1) GD-394	STIS/CCD STIS/FUV-MAMA	1	15-May-2015 21:02:32.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
04	(1) GD-394	STIS/CCD STIS/FUV-MAMA	1	15-May-2015 21:02:35.0	yes
05	(1) GD-394	STIS/CCD STIS/FUV-MAMA	1	15-May-2015 21:02:37.0	yes
06	(1) GD-394	STIS/CCD STIS/FUV-MAMA	1	15-May-2015 21:02:40.0	yes
07	(1) GD-394	STIS/CCD STIS/FUV-MAMA	1	15-May-2015 21:02:42.0	yes
08	(1) GD-394	STIS/CCD STIS/FUV-MAMA	1	15-May-2015 21:02:44.0	yes

8 Total Orbits Used

ABSTRACT

It is now undisputed that metal-pollution of the H or He atmospheres observed in a substantial fraction of white dwarfs is due to accretion of planetary debris. While significant progress has been made in establishing the frequency of such evolved planetary systems, and statistics on the abundances of the debris material are beginning to emerge, very little is known regarding the delivery mechanism of the debris. Given that the red giant progenitors of the metal-polluted white dwarfs evaporated all planetary material within >1 AU, the debris found at many white dwarfs must originate originally from a substantial distance of the star. The canonical model is that remaining planets perturb the orbits of astroids, sending them onto a white dwarf grazing course, where the extreme gravity will result in their tidal disruption. The debris then must undergo complex dynamical evolution, and eventually fall into the white dwarf atmosphere.

EUV light curves of GD394, an extremely metal-polluted white dwarf, suggest a strong variation of the metal abundances over the stellar surface. We propose to obtain spin-phase resolved high-resolution spectroscopy of GD394 over its 1.15d rotation period to resolve the abundance pattern on its surface from variations in the photospheric metal lines, and thereby probe the geometry of the circumstellar debris. Line profile variations can be used to reconstruct the surface distribution of the metals using Roche tomography. In addition, comparison to a single archive HST/GHRS observation from 1992 will place tight constraints on the long-term variation of the accretion rate, and the life time of the circumstellar debris.

Visit

Proposal 13719, Phase 0.0 (01), implementation Sat May 16 01:02:46 GMT 2015

Diagnostic Status: No Diagnostics

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

Special Requirements: Period 1.150 D AND ZERO-PHASE HJD2450004.818; GROUP 01,02,03,04,05,06,07,08 WITHIN 5D

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GD-394	RA: 21 12 44.0460 (318.1835250d) Dec: +50 06 17.86 (50.10496d) Equinox: J2000	Proper Motion RA: 89.8 mas/yr Proper Motion Dec: -17.3 mas/yr Epoch of Position: 2000	V=13.09	Reference Frame: ICRS

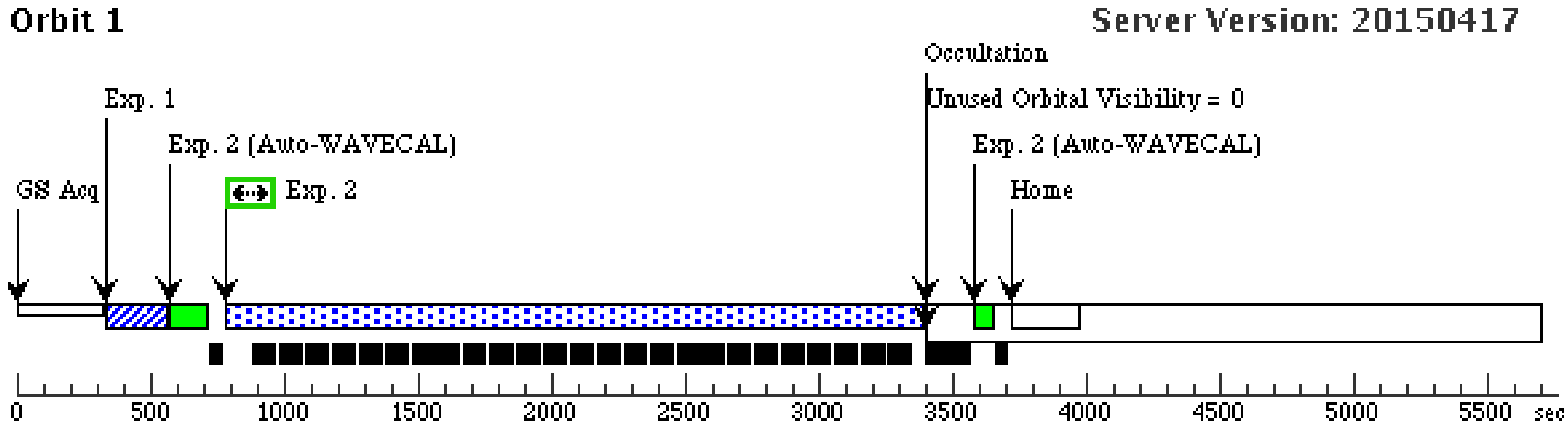
Comments: GD 394 is a DA white dwarf with Teff=39660+-636K, log g=7.88+-0.05 (Gianninas et al. 2011ApJ...743..138G). It has a well-established and stable FUV flux, based on observations with IUE (swp41457, swp14296), HST/STIS (Z0YE0A0CM, Z0YE0A0AM, Z0YE0A08M). F(1300A)=3e-12 erg/cm2/s/A.

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(STIS.ta.622198)	(1) GD-394	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT	PHASE 0.0 TO 0.03; GS ACQ SCENARIO BASE1B3		0.1 Secs (0.1 Secs) *[==>]*	*[1]*
2	(STIS.sp.622199)	(1) GD-394	STIS/FUV-MAMA, TIME-TAG, 0.2X0.2	E140M 1425 A	BUFFER-TIME=99			2595 Secs (2595 Secs) *[==>]*	*[1]*

Comments: The ETC simulation STIS.sp.622199 gives a "Count rate entire detector" of 14300 cts/s, i.e. a buffer time of 133sec. To be on the safe side, I opted for a margin of ~30%, and use the shortest possible buffer time (99sec).

Orbit Structure



Visit

Proposal 13719, Phase 0.125 (02), implementation Sat May 16 01:02:47 GMT 2015

Diagnostic Status: No Diagnostics

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

Special Requirements: Period 1.150 D AND ZERO-PHASE HJD2450004.818

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GD-394	RA: 21 12 44.0460 (318.1835250d) Dec: +50 06 17.86 (50.10496d) Equinox: J2000	Proper Motion RA: 89.8 mas/yr Proper Motion Dec: -17.3 mas/yr Epoch of Position: 2000	V=13.09	Reference Frame: ICRS

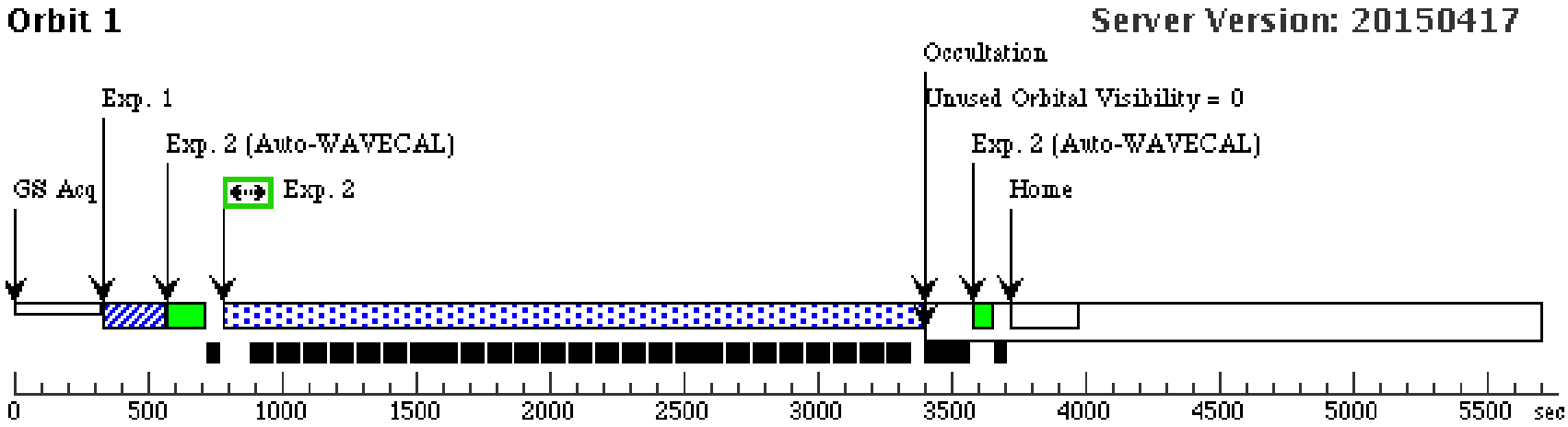
Comments: GD 394 is a DA white dwarf with Teff=39660+-636K, log g=7.88+-0.05 (Gianninas et al. 2011ApJ...743..138G). It has a well-established and stable FUV flux, based on observations with IUE (swp41457, swp14296), HST/STIS (Z0YE0A0CM, Z0YE0A0AM, Z0YE0A08M). F(1300A)=3e-12 erg/cm2/s/A.

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(STIS.ta.622198)	(1) GD-394	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT	PHASE 0.125 TO 0.155; GS ACQ SCENARIO BASE1B3		0.1 Secs (0.1 Secs) *[==>]*	 ***[1]***
2	(STIS.sp.622199)	(1) GD-394	STIS/FUV-MAMA, TIME-TAG, 0.2X0.2	E140M 1425 A	BUFFER-TIME=99			2595 Secs (2595 Secs) *[==>]*	 ***[1]***

Comments: The ETC simulation STIS.sp.622199 gives a "Count rate entire detector" of 14300 cts/s, i.e. a buffer time of 133sec. To be on the safe side, I opted for a margin of ~30%, and use the shortest possible buffer time (99sec).

Orbit Structure



Visit

Proposal 13719, Phase 0.25 (03), implementation Sat May 16 01:02:47 GMT 2015

Diagnostic Status: No Diagnostics

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

Special Requirements: Period 1.150 D AND ZERO-PHASE HJD2450004.818

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GD-394	RA: 21 12 44.0460 (318.1835250d) Dec: +50 06 17.86 (50.10496d) Equinox: J2000	Proper Motion RA: 89.8 mas/yr Proper Motion Dec: -17.3 mas/yr Epoch of Position: 2000	V=13.09	Reference Frame: ICRS

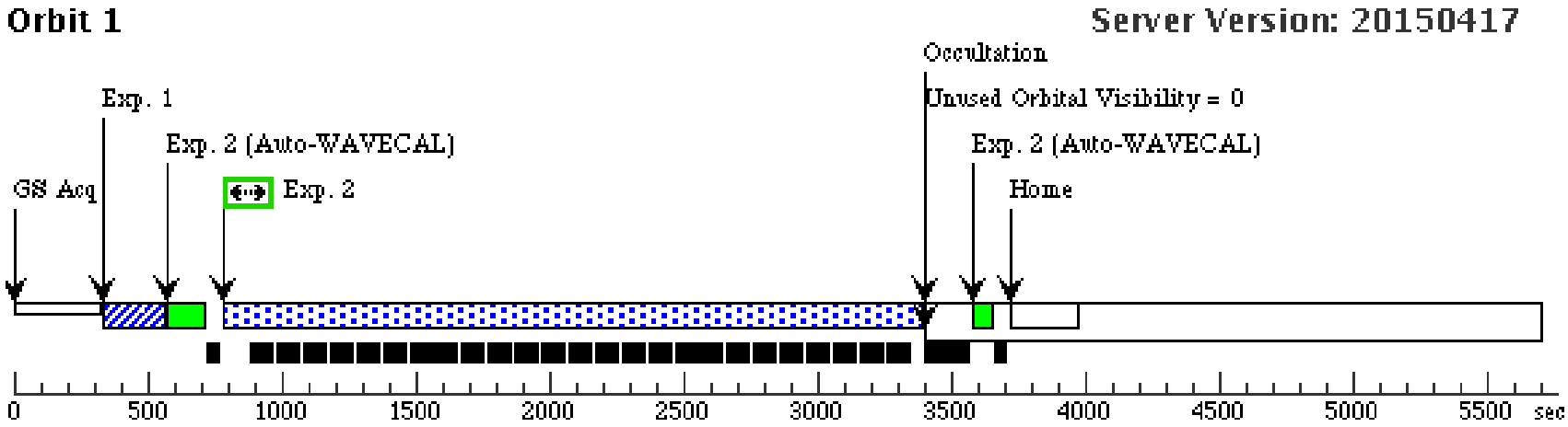
Comments: GD 394 is a DA white dwarf with Teff=39660+-636K, log g=7.88+-0.05 (Gianninas et al. 2011ApJ...743..138G). It has a well-established and stable FUV flux, based on observations with IUE (swp41457, swp14296), HST/STIS (Z0YE0A0CM, Z0YE0A0AM, Z0YE0A08M). F(1300A)=3e-12 erg/cm2/s/A.

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(STIS.ta.622198)	(1) GD-394	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT	PHASE 0.25 TO 0.28; GS ACQ SCENARIO BASE1B3		0.1 Secs (0.1 Secs) *[==>]*	*[1]*
2	(STIS.sp.622199)	(1) GD-394	STIS/FUV-MAMA, TIME-TAG, 0.2X0.2	E140M 1425 A	BUFFER-TIME=99			2595 Secs (2595 Secs) *[==>]*	*[1]*

Comments: The ETC simulation STIS.sp.622199 gives a "Count rate entire detector" of 14300 cts/s, i.e. a buffer time of 133sec. To be on the safe side, I opted for a margin of ~30%, and use the shortest possible buffer time (99sec).

Orbit Structure



Visit

Proposal 13719, Phase 0.375 (04), implementation Sat May 16 01:02:47 GMT 2015

Diagnostic Status: No Diagnostics

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

Special Requirements: Period 1.150 D AND ZERO-PHASE HJD2450004.818

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GD-394	RA: 21 12 44.0460 (318.1835250d) Dec: +50 06 17.86 (50.10496d) Equinox: J2000	Proper Motion RA: 89.8 mas/yr Proper Motion Dec: -17.3 mas/yr Epoch of Position: 2000	V=13.09	Reference Frame: ICRS

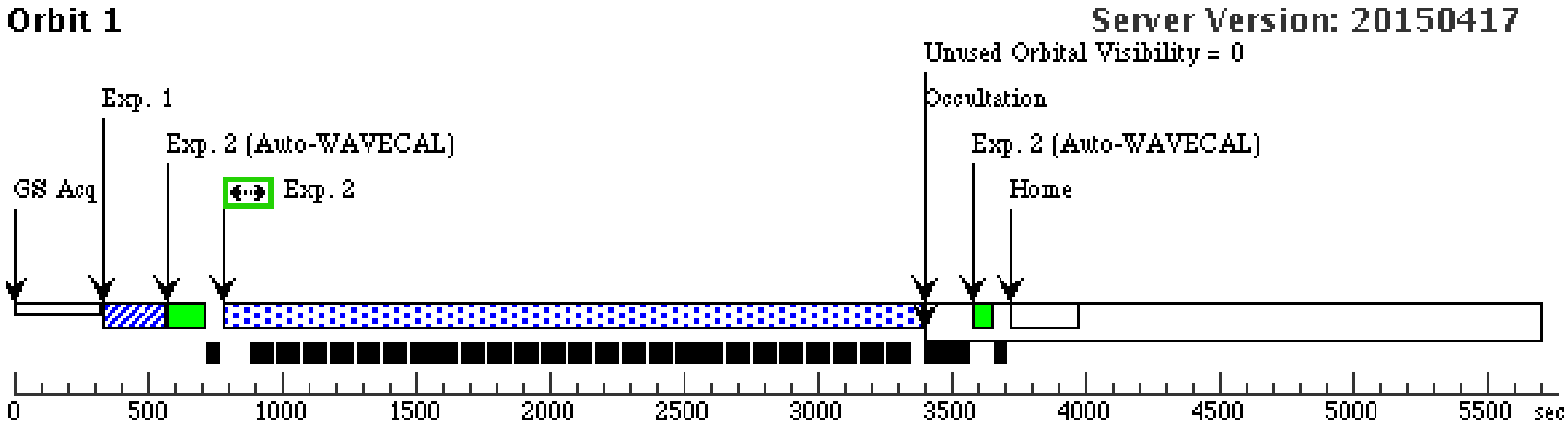
Comments: GD 394 is a DA white dwarf with Teff=39660+-636K, log g=7.88+-0.05 (Gianninas et al. 2011ApJ...743..138G). It has a well-established and stable FUV flux, based on observations with IUE (swp41457, swp14296), HST/STIS (Z0YE0A0CM, Z0YE0A0AM, Z0YE0A08M). F(1300A)=3e-12 erg/cm2/s/A.

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(STIS.ta.622198)	(1) GD-394	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT	PHASE 0.375 TO 0.405; GS ACQ SCENARIO BASE1B3		0.1 Secs (0.1 Secs) *[==>]*	 ***[1]***
2	(STIS.sp.622199)	(1) GD-394	STIS/FUV-MAMA, TIME-TAG, 0.2X0.2	E140M 1425 A	BUFFER-TIME=99			2595 Secs (2595 Secs) *[==>]*	 ***[1]***

Comments: The ETC simulation STIS.sp.622199 gives a "Count rate entire detector" of 14300 cts/s, i.e. a buffer time of 133sec. To be on the safe side, I opted for a margin of ~30%, and use the shortest possible buffer time (99sec).

Orbit Structure



Visit

Proposal 13719, Phase 0.5 (05), implementation Sat May 16 01:02:47 GMT 2015

Diagnostic Status: No Diagnostics

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

Special Requirements: Period 1.150 D AND ZERO-PHASE HJD2450004.818

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GD-394	RA: 21 12 44.0460 (318.1835250d) Dec: +50 06 17.86 (50.10496d) Equinox: J2000	Proper Motion RA: 89.8 mas/yr Proper Motion Dec: -17.3 mas/yr Epoch of Position: 2000	V=13.09	Reference Frame: ICRS

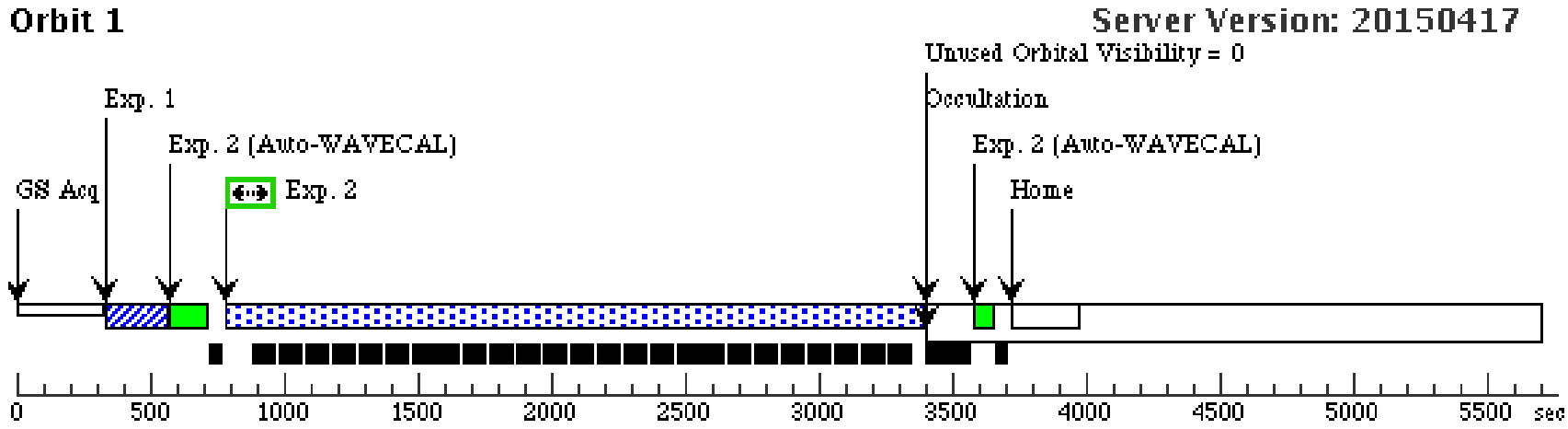
Comments: GD 394 is a DA white dwarf with Teff=39660+-636K, log g=7.88+-0.05 (Gianninas et al. 2011ApJ...743..138G). It has a well-established and stable FUV flux, based on observations with IUE (swp41457, swp14296), HST/STIS (Z0YE0A0CM, Z0YE0A0AM, Z0YE0A08M). F(1300A)=3e-12 erg/cm2/s/A.

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(STIS.ta.622198)	(1) GD-394	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT	PHASE 0.5 TO 0.53; GS ACQ SCENARIO BASE1B3		0.1 Secs (0.1 Secs) *[==>]*	 ***[1]***
2	(STIS.sp.622199)	(1) GD-394	STIS/FUV-MAMA, TIME-TAG, 0.2X0.2	E140M 1425 A	BUFFER-TIME=99			2595 Secs (2595 Secs) *[==>]*	 ***[1]***

Comments: The ETC simulation STIS.sp.622199 gives a "Count rate entire detector" of 14300 cts/s, i.e. a buffer time of 133sec. To be on the safe side, I opted for a margin of ~30%, and use the shortest possible buffer time (99sec).

Orbit Structure



Visit

Proposal 13719, Phase 0.625 (06), implementation Sat May 16 01:02:47 GMT 2015

Diagnostic Status: No Diagnostics

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

Special Requirements: Period 1.150 D AND ZERO-PHASE HJD2450004.818

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GD-394	RA: 21 12 44.0460 (318.1835250d) Dec: +50 06 17.86 (50.10496d) Equinox: J2000	Proper Motion RA: 89.8 mas/yr Proper Motion Dec: -17.3 mas/yr Epoch of Position: 2000	V=13.09	Reference Frame: ICRS

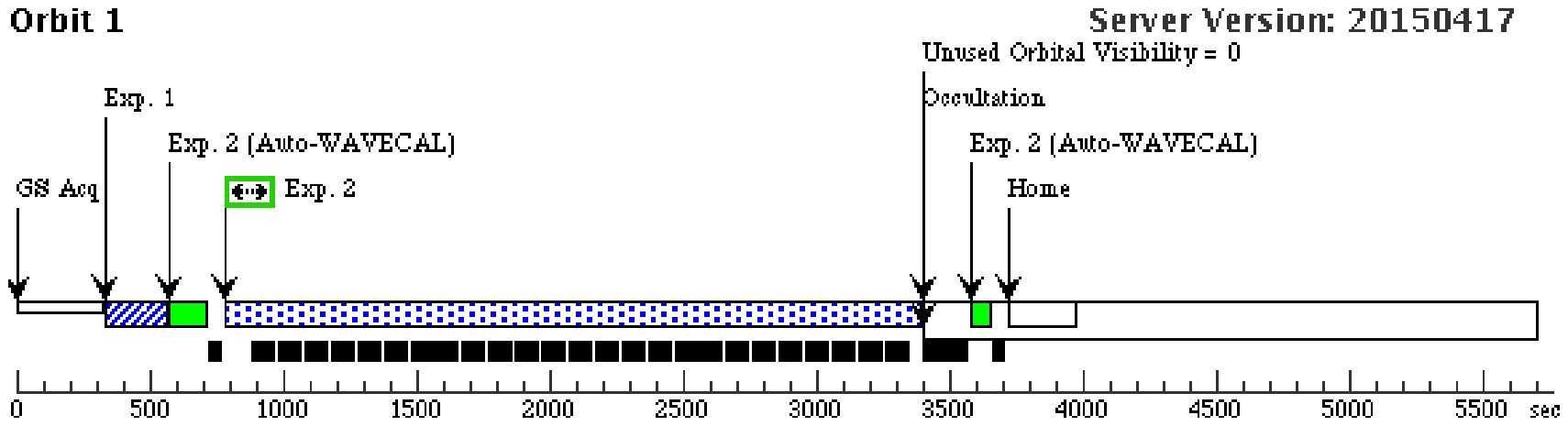
Comments: GD 394 is a DA white dwarf with Teff=39660+-636K, log g=7.88+-0.05 (Gianninas et al. 2011ApJ...743..138G). It has a well-established and stable FUV flux, based on observations with IUE (swp41457, swp14296), HST/STIS (Z0YE0A0CM, Z0YE0A0AM, Z0YE0A08M). F(1300A)=3e-12 erg/cm2/s/A.

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(STIS.ta.622198)	(1) GD-394	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT	PHASE 0.625 TO 0.655; GS ACQ SCENARIO BASE1B3		0.1 Secs (0.1 Secs) *[==>]*	*[1]*
2	(STIS.sp.622199)	(1) GD-394	STIS/FUV-MAMA, TIME-TAG, 0.2X0.2	E140M 1425 A	BUFFER-TIME=99			2595 Secs (2595 Secs) *[==>]*	*[1]*

Comments: The ETC simulation STIS.sp.622199 gives a "Count rate entire detector" of 14300 cts/s, i.e. a buffer time of 133sec. To be on the safe side, I opted for a margin of ~30%, and use the shortest possible buffer time (99sec).

Orbit Structure



Visit

Proposal 13719, Phase 0.75 (07), implementation Sat May 16 01:02:47 GMT 2015

Diagnostic Status: No Diagnostics

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

Special Requirements: Period 1.150 D AND ZERO-PHASE HJD2450004.818

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GD-394	RA: 21 12 44.0460 (318.1835250d) Dec: +50 06 17.86 (50.10496d) Equinox: J2000	Proper Motion RA: 89.8 mas/yr Proper Motion Dec: -17.3 mas/yr Epoch of Position: 2000	V=13.09	Reference Frame: ICRS

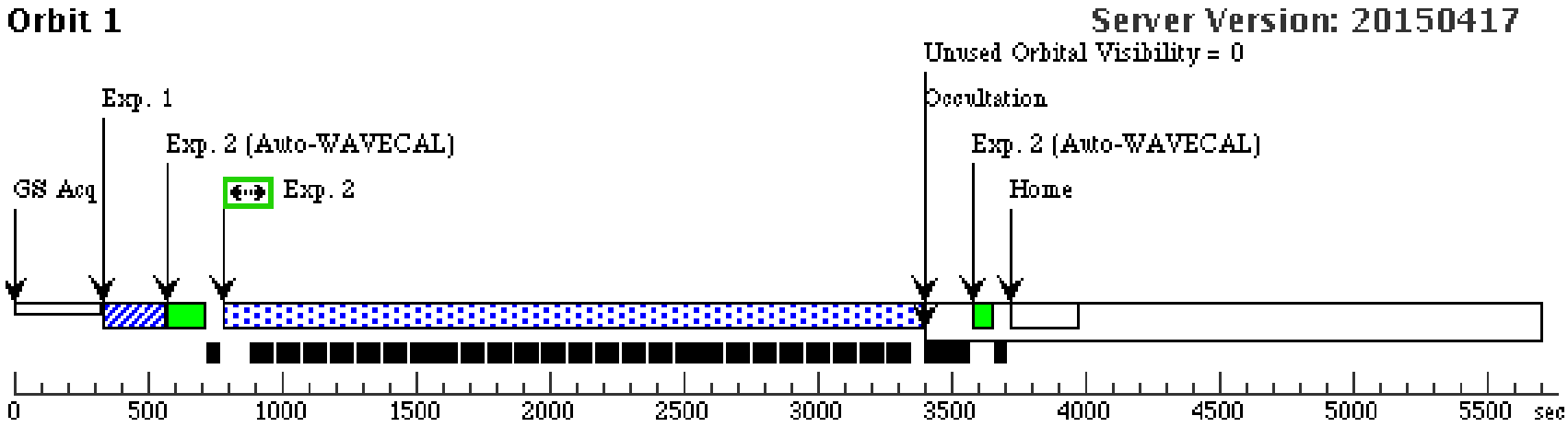
Comments: GD 394 is a DA white dwarf with Teff=39660+-636K, log g=7.88+-0.05 (Gianninas et al. 2011ApJ...743..138G). It has a well-established and stable FUV flux, based on observations with IUE (swp41457, swp14296), HST/STIS (Z0YE0A0CM, Z0YE0A0AM, Z0YE0A08M). F(1300A)=3e-12 erg/cm2/s/A.

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(STIS.ta.622198)	(1) GD-394	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT	PHASE 0.75 TO 0.78; GS ACQ SCENARIO BASE1B3		0.1 Secs (0.1 Secs) *[==>]*	*[1]*
2	(STIS.sp.622199)	(1) GD-394	STIS/FUV-MAMA, TIME-TAG, 0.2X0.2	E140M 1425 A	BUFFER-TIME=99			2595 Secs (2595 Secs) *[==>]*	*[1]*

Comments: The ETC simulation STIS.sp.622199 gives a "Count rate entire detector" of 14300 cts/s, i.e. a buffer time of 133sec. To be on the safe side, I opted for a margin of ~30%, and use the shortest possible buffer time (99sec).

Orbit Structure



Visit

Proposal 13719, Phase 0.875 (08), implementation Sat May 16 01:02:48 GMT 2015

Diagnostic Status: No Diagnostics

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

Special Requirements: Period 1.150 D AND ZERO-PHASE HJD2450004.818

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GD-394	RA: 21 12 44.0460 (318.1835250d) Dec: +50 06 17.86 (50.10496d) Equinox: J2000	Proper Motion RA: 89.8 mas/yr Proper Motion Dec: -17.3 mas/yr Epoch of Position: 2000	V=13.09	Reference Frame: ICRS

Comments: GD 394 is a DA white dwarf with Teff=39660+-636K, log g=7.88+-0.05 (Gianninas et al. 2011ApJ...743..138G). It has a well-established and stable FUV flux, based on observations with IUE (swp41457, swp14296), HST/STIS (Z0YE0A0CM, Z0YE0A0AM, Z0YE0A08M). F(1300A)=3e-12 erg/cm2/s/A.

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	(STIS.ta.622198)	(1) GD-394	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT	PHASE 0.875 TO 0.905; GS ACQ SCENARIO BASE1B3		0.1 Secs (0.1 Secs) *[==>]*	*[1]*
2	(STIS.sp.622199)	(1) GD-394	STIS/FUV-MAMA, TIME-TAG, 0.2X0.2	E140M 1425 A	BUFFER-TIME=99			2595 Secs (2595 Secs) *[==>]*	*[1]*

Comments: The ETC simulation STIS.sp.622199 gives a "Count rate entire detector" of 14300 cts/s, i.e. a buffer time of 133sec. To be on the safe side, I opted for a margin of ~30%, and use the shortest possible buffer time (99sec).

Orbit Structure