



11699 - On the evolutionary status of extremely hot helium stars - are the O(He) stars successors of the R CrB stars?

Cycle: 17, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(1) K1-27-CENTRAL-STAR	COS/FUV	1	11-Mar-2009 21:02:37.0	yes
02	(2) LOTR-4-CENTRAL-STAR	COS/FUV	1	11-Mar-2009 21:02:44.0	yes
03	(3) HS-1522+6615	COS/FUV	1	11-Mar-2009 21:02:48.0	yes
04	(4) HS-2209+8229	COS/FUV	1	11-Mar-2009 21:02:52.0	yes

4 Total Orbits Used

ABSTRACT

We propose UV spectroscopy of the four unique post-AGB stars of spectral type O(He) in order to understand the origin of their peculiar surface abundances. These stars are the only known amongst the hottest post-AGB stars (effective temperatures $> 100,000$ K) whose atmospheres are composed of almost pure helium. This chemistry markedly differs from that of the hydrogen-deficient post-AGB evolutionary sequence with objects which have carbon dominated atmospheres (PG1159 stars and Wolf-Rayet central stars).

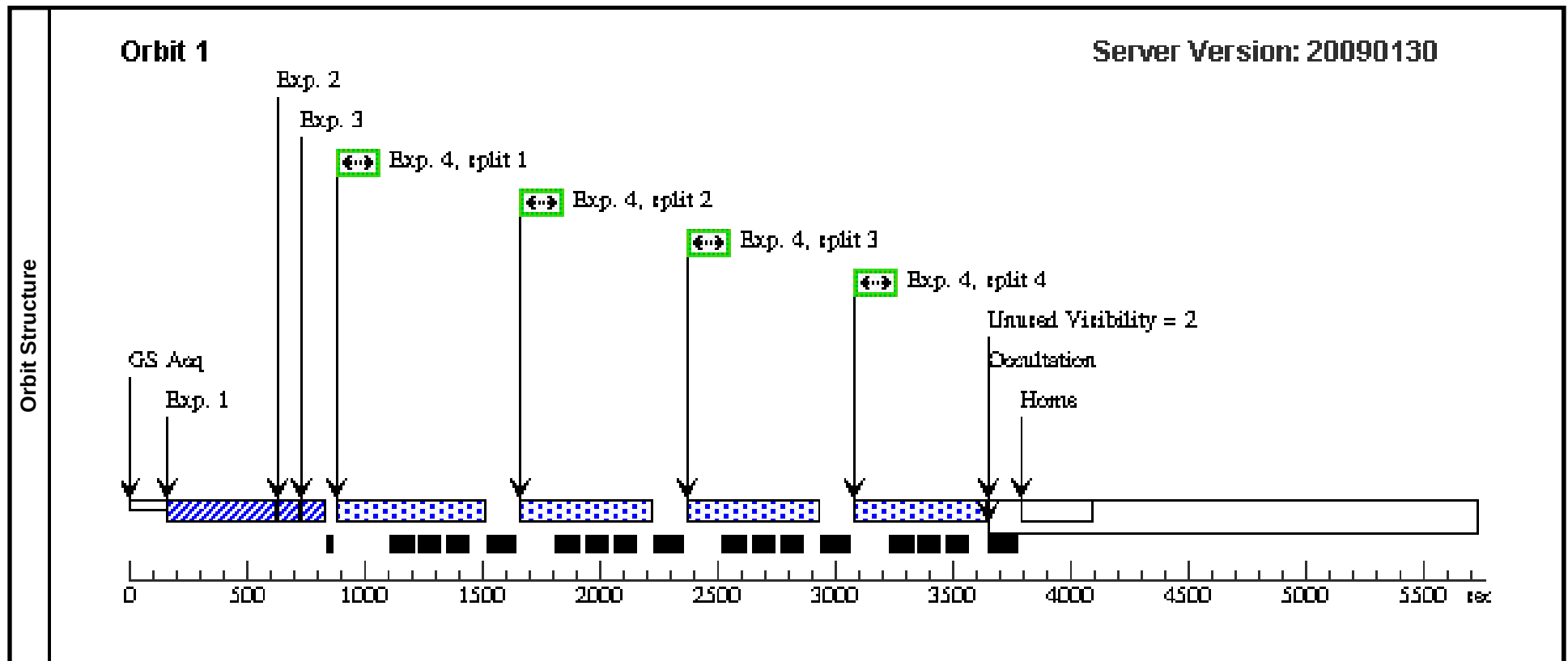
While PG1159 and Wolf-Rayet stars are the result of a late helium-shell flash, this scenario cannot explain the O(He) stars. Instead, they are possibly double-degenerate mergers. We speculate that the four O(He) stars represent evolved RCrB stars, which also have helium-dominated atmospheres. We aim to determine the C, N, O, and Si abundances precisely, in order to proof this evolutionary link.

OBSERVING DESCRIPTION

We propose to take medium-resolution high S/N spectra with COS/FUV of the four O(He) stars. With grating G140L we cover the wavelength range 1105 / 2203Å including many diagnostic metal lines. A resolution of about 0.5Å is sufficient for our purpose because the lines are relatively broad. We aim to achieve $S/N > 50$ at 1425Å which is necessary from our experience with STIS/G140L observations. The respective exposure time have been determined with the COS Exposure Time Calculator using theoretical NLTE model atmospheres. For any of the four objects, the S/N can be obtained within one orbit.

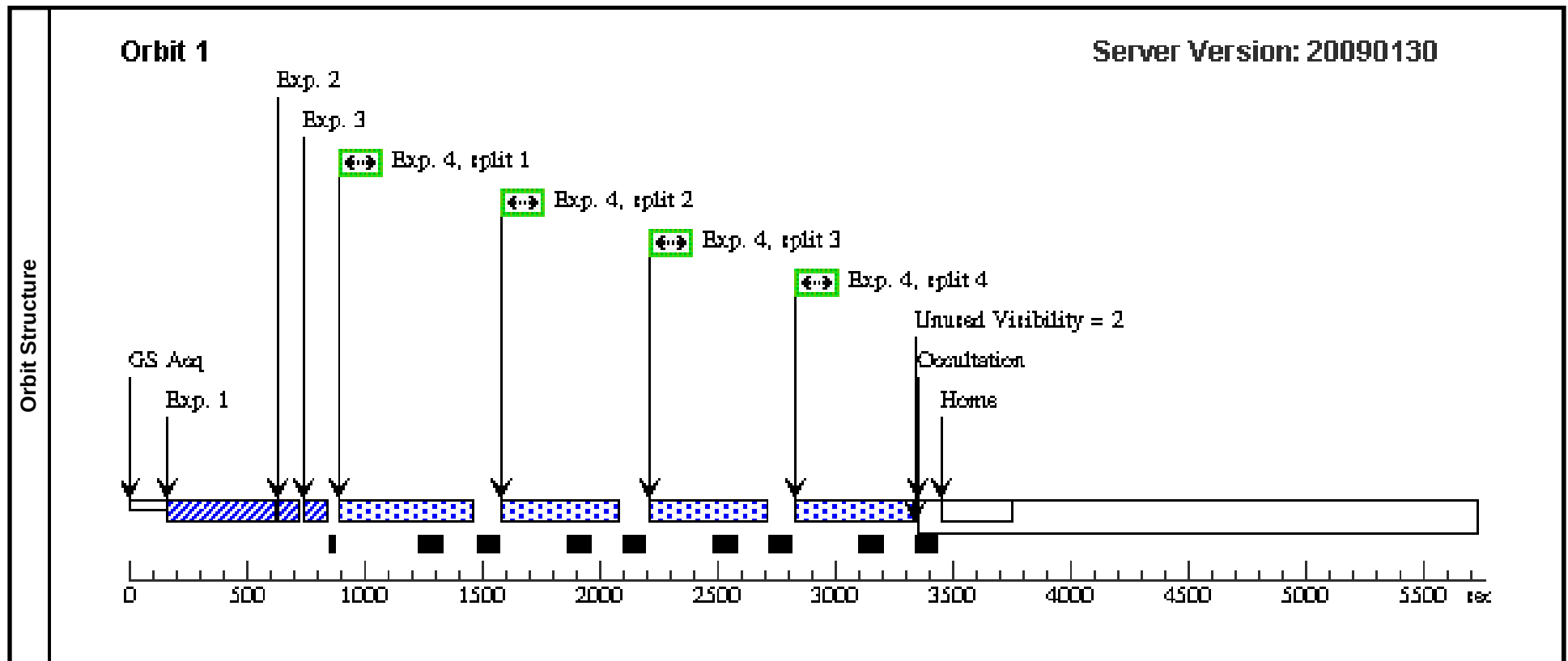
Proposal 11699 - Visit 01 - On the evolutionary status of extremely hot helium stars - are the O(He) stars successors...

Visit	Proposal 11699, Visit 01, implementation										Thu Mar 12 01:02:56 GMT 2009
	Diagnostic Status: No Diagnostics										
	Scientific Instruments: COS/FUV										
	Special Requirements: (none)										
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(1)	K1-27-CENTRAL-STAR	RA: 05 57 2.1350 (89.2588958d)				V=16.7+/-0.2		Reference Frame: ICRS		
			Dec: -75 40 22.51 (-75.67292d)				FUSE: log (Flambda / erg/cm**				
			Equinox: J2000				2/sec/A) = -12.5				
	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	K1-27 a	(1) K1-27-CENTRAL-STAR	COS/FUV, ACQ/SEARCH, PSA	G140L	STEP-SIZE=1.767;			0.2 Secs		
					1105 A	CENTER=FLUX-W			[==>]		[1]
						T;					
						SCAN-SIZE=3;					
						SEGMENT=A					
	2	K1-27 b	(1) K1-27-CENTRAL-STAR	COS/FUV, ACQ/PEAKXD, PSA	G140L	SEGMENT=A			0.2 Secs		
					1105 A				[==>]		[1]
3	K1-27 c	(1) K1-27-CENTRAL-STAR	COS/FUV, ACQ/PEAKD, PSA	G140L	CENTER=DEF;			0.2 Secs			
				1105 A	NUM-POS=3;			[==>]		[1]	
					STEP-SIZE=1.2;						
					SEGMENT=A						
4	K1-27 d	(1) K1-27-CENTRAL-STAR	COS/FUV, TIME-TAG, PSA	G140L	BUFFER-TIME=12			2020 Secs			
				1105 A	0;			[==>(Split 1)]		[1]	
					FP-POS=AUTO;			[==>(Split 2)]			
					FLASH=YES;			[==>(Split 3)]			
					SEGMENT=A			[==>(Split 4)]			



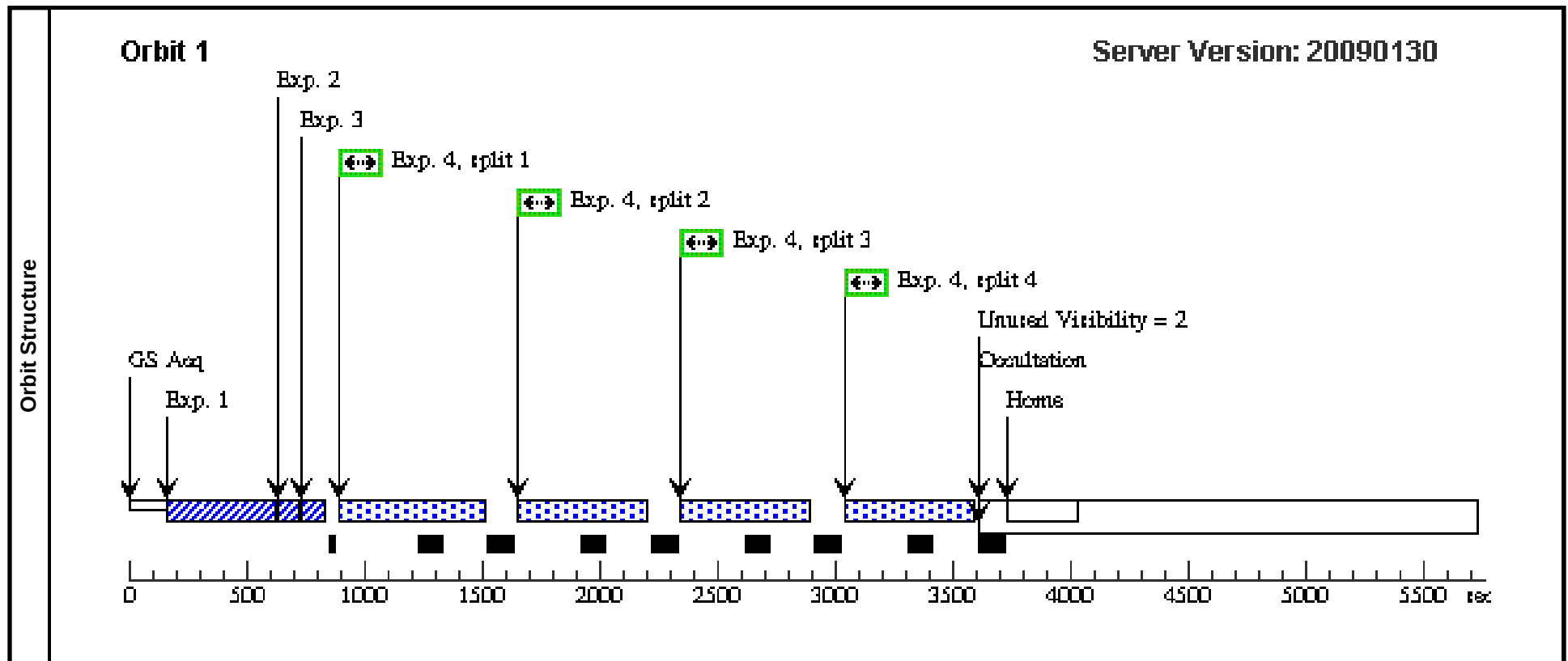
Proposal 11699 - Visit 02 - On the evolutionary status of extremely hot helium stars - are the O(He) stars successors...

Visit	Proposal 11699, Visit 02, implementation										Thu Mar 12 01:02:57 GMT 2009
	Diagnostic Status: No Diagnostics										
	Scientific Instruments: COS/FUV										
	Special Requirements: (none)										
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(2)	LOTR-4-CENTRAL-STAR	RA: 11 52 29.2310 (178.1217958d) Dec: -42 17 38.69 (-42.29408d) Equinox: J2000		Proper Motion RA: 0.0001333s/yr Proper Motion Dec: 0.018"/yr Epoch of Position: 2000		V=16.1+/-0.2 FUSE: log (Flambda / erg/cm**2/sec/A) = -13.2		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	LoTr4 a	(2) LOTR-4-CENTRAL-STAR	COS/FUV, ACQ/SEARCH, PSA	G140L 1105 A	STEP-SIZE=1.767; CENTER=FLUX-WT; SCAN-SIZE=3; SEGMENT=A			0.9 Secs [==>]	[1]	
	2	LoTr4 b	(2) LOTR-4-CENTRAL-STAR	COS/FUV, ACQ/PEAKXD, PSA	G140L 1105 A	SEGMENT=A			0.9 Secs [==>]	[1]	
	3	LoTr4 c	(2) LOTR-4-CENTRAL-STAR	COS/FUV, ACQ/PEAKD, PSA	G140L 1105 A	CENTER=DEF; NUM-POS=3; STEP-SIZE=1.2; SEGMENT=A			0.9 Secs [==>]	[1]	
	4	LoTr4 d	(2) LOTR-4-CENTRAL-STAR	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=240; FP-POS=AUTO; FLASH=YES; SEGMENT=A			1786 Secs [==>(Split 1)] [==>(Split 2)] [==>(Split 3)] [==>(Split 4)]	[1]	



Proposal 11699 - Visit 03 - On the evolutionary status of extremely hot helium stars - are the O(He) stars successors...

Visit	Proposal 11699, Visit 03, implementation										Thu Mar 12 01:02:57 GMT 2009
	Diagnostic Status: No Diagnostics										
	Scientific Instruments: COS/FUV										
	Special Requirements: (none)										
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(3)	HS-1522+6615	RA: 15 22 56.7000 (230.7362500d)				V=16.6+/-0.2		Reference Frame: ICRS		
			Dec: +66 04 42.10 (66.07836d)				FUSE: log (Flambda / erg/cm**				
			Equinox: J2000				2/sec/A) = -12.8				
	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	HS1522 a	(3) HS-1522+6615	COS/FUV, ACQ/SEARCH, PSA	G140L	STEP-SIZE=1.767;			0.4 Secs		
					1105 A	CENTER=FLUX-W			[==>]		[1]
						T;					
						SCAN-SIZE=3;					
						SEGMENT=A					
	2	HS1522 b	(3) HS-1522+6615	COS/FUV, ACQ/PEAKXD, PSA	G140L	SEGMENT=A			0.4 Secs		
					1105 A				[==>]		[1]
3	HS1522 c	(3) HS-1522+6615	COS/FUV, ACQ/PEAKD, PSA	G140L	CENTER=DEF;			0.4 Secs			
				1105 A	NUM-POS=3;			[==>]		[1]	
					STEP-SIZE=1.2;						
					SEGMENT=A						
4	HS1522 d	(3) HS-1522+6615	COS/FUV, TIME-TAG, PSA	G140L	BUFFER-TIME=24				1998 Secs		
				1105 A	0;				[==>(Split 1)]		[1]
					FP-POS=AUTO;				[==>(Split 2)]		
					FLASH=YES;				[==>(Split 3)]		
					SEGMENT=A				[==>(Split 4)]		



Proposal 11699 - Visit 04 - On the evolutionary status of extremely hot helium stars - are the O(He) stars successors...

Visit	Proposal 11699, Visit 04, implementation										Thu Mar 12 01:02:57 GMT 2009
	Diagnostic Status: No Diagnostics										
	Scientific Instruments: COS/FUV										
	Special Requirements: (none)										
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(4)	HS-2209+8229	RA: 22 08 25.8000 (332.1075000d)				V=16.6+/-0.2		Reference Frame: ICRS		
			Dec: +82 44 52.00 (82.74778d)				FUSE: log (Flambda / erg/cm**				
			Equinox: J2000				2/sec/A) = -13.1				
	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	HS2209 a	(4) HS-2209+8229	COS/FUV, ACQ/SEARCH, PSA	G140L	STEP-SIZE=1.767;			0.8 Secs		
					1105 A	CENTER=FLUX-W			[==>]		[1]
						T;					
						SCAN-SIZE=3;					
						SEGMENT=A					
	2	HS2209 b	(4) HS-2209+8229	COS/FUV, ACQ/PEAKXD, PSA	G140L	SEGMENT=A			0.8 Secs		
					1105 A				[==>]		[1]
3	HS2209 c	(4) HS-2209+8229	COS/FUV, ACQ/PEAKD, PSA	G140L	CENTER=DEF;			0.8 Secs			
				1105 A	NUM-POS=3;			[==>]		[1]	
					STEP-SIZE=1.2;						
					SEGMENT=A						
4	HS2209 d	(4) HS-2209+8229	COS/FUV, TIME-TAG, PSA	G140L	BUFFER-TIME=25				2042 Secs		
				1105 A	0;				[==>(Split 1)]		[1]
					FP-POS=AUTO;				[==>(Split 2)]		
					FLASH=YES;				[==>(Split 3)]		
					SEGMENT=A				[==>(Split 4)]		

