



12571 - The Crab Halo

Cycle: 19, 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) M-1	COS/FUV	3	11-Jul-2011 22:36:53.0	yes
02	(1) M-1	COS/FUV	3	11-Jul-2011 22:37:01.0	yes

6 Total Orbits Used

ABSTRACT

The Crab Nebula, along with its central pulsar and its explosive origin in SN 1054, plays a crucial role in our understanding of the link between supernovae and pulsar formation and activity.

Yet, there are fundamental uncertainties in the nature of the event that have not been settled in more than two decades of investigation.

The observed mass in the nebula and pulsar is nearly half of the

expected initial stellar mass and the observed energy (much of which may come from the central pulsar) is only a few percent of the typical supernova energy.

An attractive solution to this "missing mass" problem is that this mass is in a high velocity envelope around the observed Crab Nebula.

The envelope would have most of the energy of the explosion (roughly 10^{51} ergs), bringing the energy up to that typical of a Type II supernova. The fact that the Crab filaments have a measured acceleration and show no deceleration at the outer edge is consistent with this hypothesis. The lack of an interaction region created by the fast shell can be attributed to a very low density around the supernova. We propose to search for the fast shell by taking a COS spectrum of the Crab pulsar in the region of the C IV 1550 line. We have carried out time-dependent ionization calculations that show that this line should produce a detectable broad, blueshifted absorption if the shell is present.

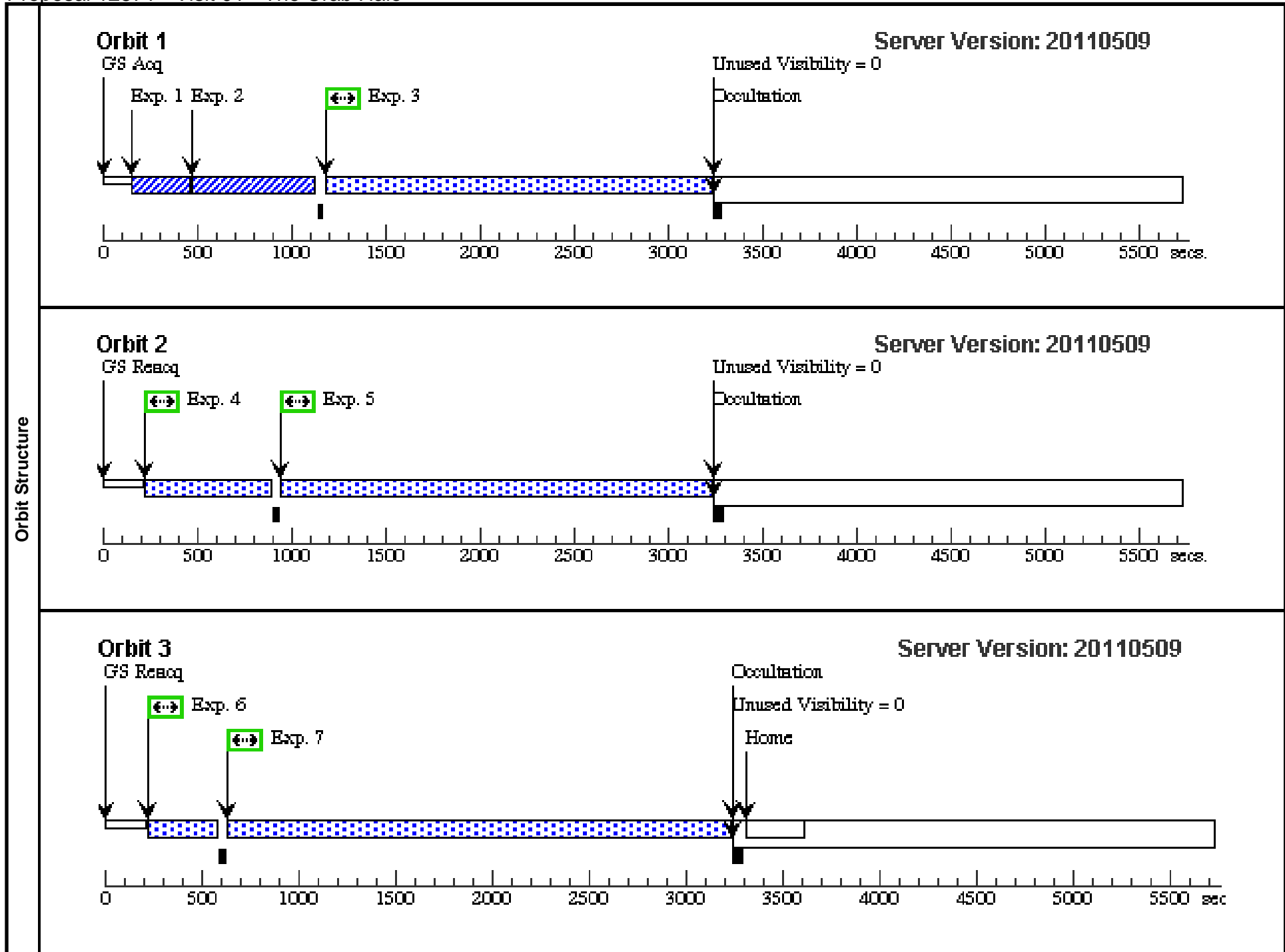
OBSERVING DESCRIPTION

The Crab Nebula, along with its central pulsar and its explosive origin in SN 1054, plays a crucial role in our understanding of the link between supernovae and pulsar formation and activity. Yet, the observed mass in the nebula and pulsar is nearly half of the expected initial stellar mass and the observed energy (much of which may come from the central pulsar) is only a few percent of the typical supernova energy. This observing program searches for the fast, outer shell of the Crab Nebula by taking a COS G160M spectrum of the Crab pulsar in the region of the C IV 1550 line. The 1623 setting of G160M is used to increase the spectral coverage in the continuum on the red side of the C IV 1550 feature. The observation is being executed as two 3-orbit visits to maximize schedulability. In order to maximize exposure time while maintaining good data quality, each 3-orbit visit is executed as three exposures of 2546 sec, one each at FPPOS=2, 3, and 4.

Proposal 12571 - Visit 01 - The Crab Halo

Tue Jul 12 02:37:06 GMT 2011

Visit	Proposal 12571, Visit 01 Diagnostic Status: Warning Scientific Instruments: COS/FUV Special Requirements: PCS MODE FINE									
	(Visit 01) Warning (Form): For the best data quality, it is strongly recommended that all four FP-POS positions be used when observing at a given COS CENWAVE setting. (Visit 01) Warning (Form): If the target coordinates are not known to 0.4" (or better) an ACQ/SEARCH should precede the ACQ/PEAKXD.									
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	M-1	RA: 05 34 31.9500 (83.6331250d) Dec: +22 00 52.10 (22.01447d) Equinox: J2000		V=17+/-1	Reference Frame: ICRS				
<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. This object was generated by the targetselector and retrieved from the SIMBAD database.</i>										
Exposures	#	Label (ETC Run)	Target	Config, Mode, Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	(183269)	(1) M-1	COS/FUV, ACQ/PEAKXD, PSA	G160M 1600 A	SEGMENT=BOTH			100 Secs [==>]	[1]
	2	(183269)	(1) M-1	COS/FUV, ACQ/PEAKD, PSA	G160M 1600 A	SEGMENT=BOTH; NUM-POS=5; CENTER=FLUX-W T-FLR; STEP-SIZE=0.9			100 Secs [==>]	[1]
	3	(183217)	(1) M-1	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=60 00; FP-POS=2			1930 Secs [==>]	[1]
	4	(183217)	(1) M-1	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=60 00; FP-POS=2			616 Secs [==>]	[2]
	5	(183217)	(1) M-1	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=60 00; FP-POS=3			2238 Secs [==>]	[2]
	6	(183217)	(1) M-1	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=60 00; FP-POS=3			308 Secs [==>]	[3]
	7	(183217)	(1) M-1	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=60 00; FP-POS=4			2546 Secs [==>]	[3]

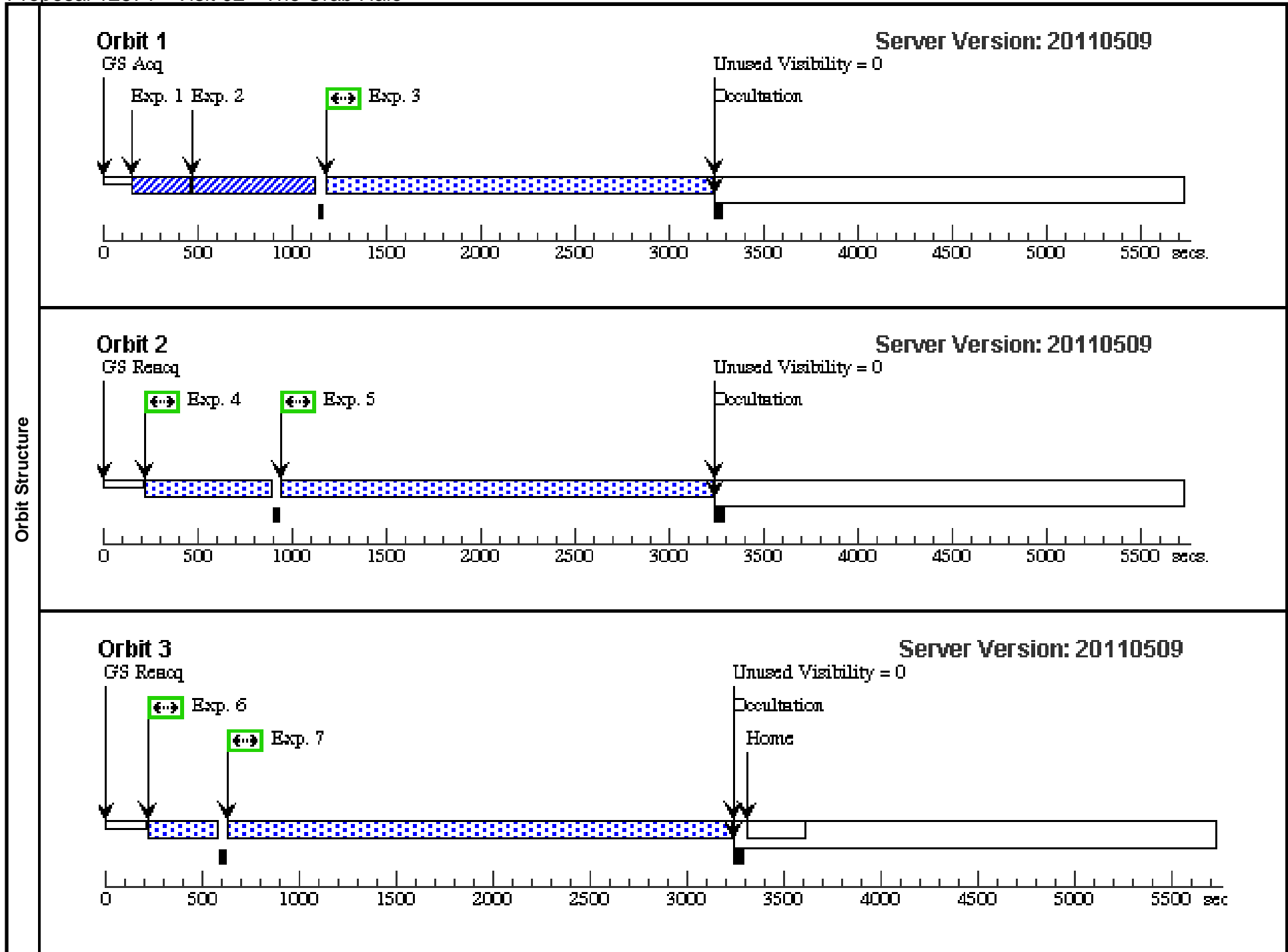


Orbit Structure

Proposal 12571 - Visit 02 - The Crab Halo

Tue Jul 12 02:37:07 GMT 2011

Visit	Proposal 12571, Visit 02 Diagnostic Status: Warning Scientific Instruments: COS/FUV Special Requirements: PCS MODE FINE									
	(Visit 02) Warning (Form): If the target coordinates are not known to 0.4" (or better) an ACQ/SEARCH should precede the ACQ/PEAKXD. (Visit 02) Warning (Form): For the best data quality, it is strongly recommended that all four FP-POS positions be used when observing at a given COS CENWAVE setting.									
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	M-1	RA: 05 34 31.9500 (83.6331250d) Dec: +22 00 52.10 (22.01447d) Equinox: J2000		V=17+/-1	Reference Frame: ICRS				
<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. This object was generated by the targetselector and retrieved from the SIMBAD database.</i>										
Exposures	#	Label (ETC Run)	Target	Config, Mode, Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	(183269)	(1) M-1	COS/FUV, ACQ/PEAKXD, PSA	G160M 1600 A	SEGMENT=BOTH			100 Secs [==>]	[1]
	2	(183269)	(1) M-1	COS/FUV, ACQ/PEAKD, PSA	G160M 1600 A	SEGMENT=BOTH; NUM-POS=5; CENTER=FLUX-W T-FLR; STEP-SIZE=0.9			100 Secs [==>]	[1]
	3	(183217)	(1) M-1	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=60 00; FP-POS=2			1930 Secs [==>]	[1]
	4	(183217)	(1) M-1	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=60 00; FP-POS=2			616 Secs [==>]	[2]
	5	(183217)	(1) M-1	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=60 00; FP-POS=3			2238 Secs [==>]	[2]
	6	(183217)	(1) M-1	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=60 00; FP-POS=3			308 Secs [==>]	[3]
	7	(183217)	(1) M-1	COS/FUV, TIME-TAG, PSA	G160M 1623 A	BUFFER-TIME=60 00; FP-POS=4			2546 Secs [==>]	[3]



Orbit Structure