15411 - VLBA monitoring of the extraordinary changing-look quasar Mrk 1018

Cycle: 25, 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) MRK-1018	COS/FUV COS/NUV	4	11-Dec-2017 20:00:16.0	yes
02	(1) MRK-1018	COS/FUV COS/NUV	2	11-Dec-2017 20:00:18.0	yes

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
03	(1) MRK-1018	COS/FUV COS/NUV	2	11-Dec-2017 20:00:19.0	yes

8 Total Orbits Used

ABSTRACT

Last year, we discovered the first-ever unambiguous case of a changing look quasar completing a full cycle, Mrk1018, which first transitioned from a Sy 1.9 to a Sy 1 nucleus in 1984, remained broad-lined for about 30 years, and transitioned back to a Sy 1.9 sometime between 2013 and 2016. We were granted ToO VLBA observations during the second semester of 2016, which indicated flux density and spectral variability of the AGN core of Mrk1018 at GHz frequencies and, very remarkably, showed the emergence of a new compact component on December 2016). Additional VLBA DDT observations have shown the VLBA source disappear, while HST photometry is now dropping, while we expected it to be raising, Here, we request up to four multi-frequency VLBA observations to be done contemporaneously with requested HST COS observations and approved Chandra X-ray and optical monitoring to shed light on the nature of the puzzling behavior of Mrk 1018 and the (now disappeared) new source. The VLBA, with its unique multi-frequency capabilities and milliarcsecond angular resolution, may hold the key to understanding Mrk1018 and, by extension, the wider class of changing look AGN.

OBSERVING DESCRIPTION

These COS-FUV observations are part of a coordinated multi-wavelength monitoring program combining radio (VLBA), X-rays (Chandra), and optical observations of the changing-look AGN Mrk1018. Each epoch we obtain a 2 orbit long FUV spectrum with the G140L grating to cover the FUV continuum at high S/N as well as the flux and shape of broad emission lines such as Lya and CIV. Although we have 4 epochs of VLBA and chandra observations granted, one will be in the extended sun block zone between end of February and beginning of June. Hence, we use two orbits to obtain a higher resolution spectrum with the G130M grating of the Lya line which is prone to various narrow absorption lines. This is necessary to calibrate the modelling of the broad Lya emission line in the low resolution spectra based on a single high-resolution spectrum.

Visit

Proposal 15411, FUV-COS Mrk1018 (01) Tue Dec 12 01:00:20 GMT 2017

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: BETWEEN 18-JAN-2018:00:00:00 AND 14-FEB-2018:00:00:00

Fixed Targets

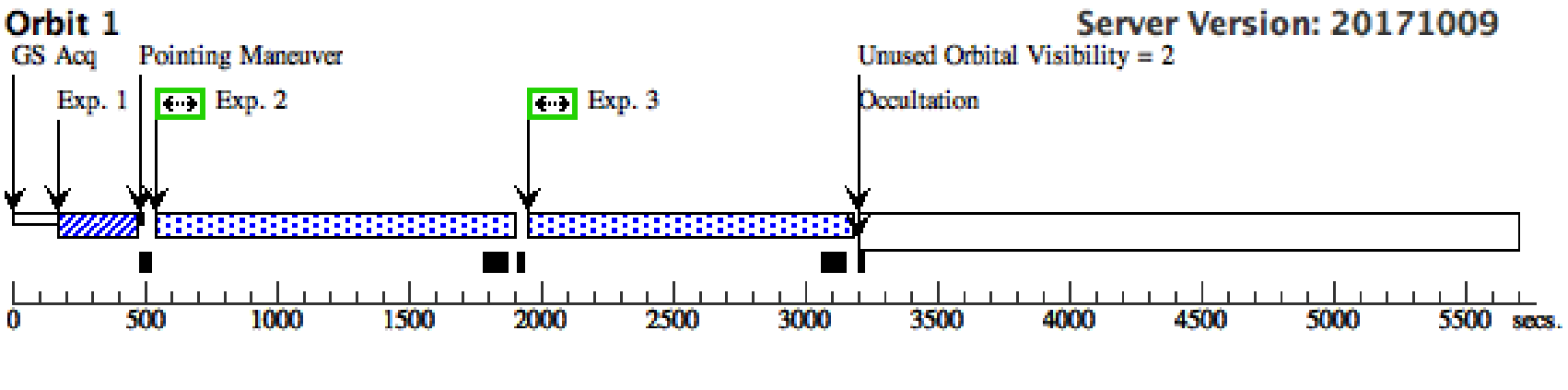
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	MRK-1018	RA: 02 06 15.9888 (31.5666200d) Dec: -00 17 29.18 (-.29144d) Equinox: J2000		V=15.0+/-0.5 300 counts/s in the 4s long COS NUV (PSA and MIRRORA) acquisition images from Feb 2017	Reference Frame: ICRS

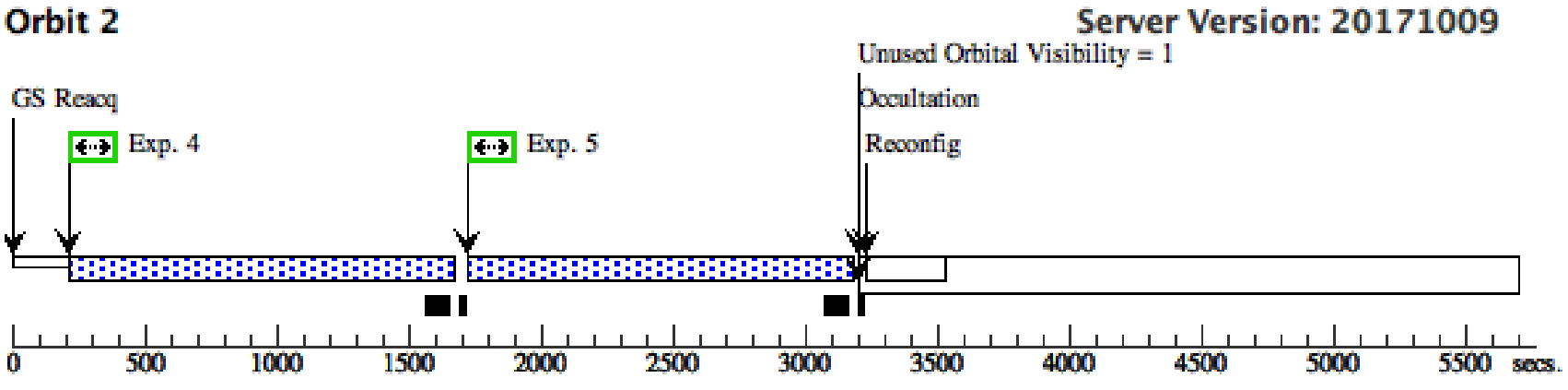
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Coordinates were then slightly adjusted on subarcsec scale to match the coordinates of previous successfull observations
Category=GALAXY
Description=[ACCRETION DISK, JET, NUCLEUS, SEYFERT]
Extended=NO

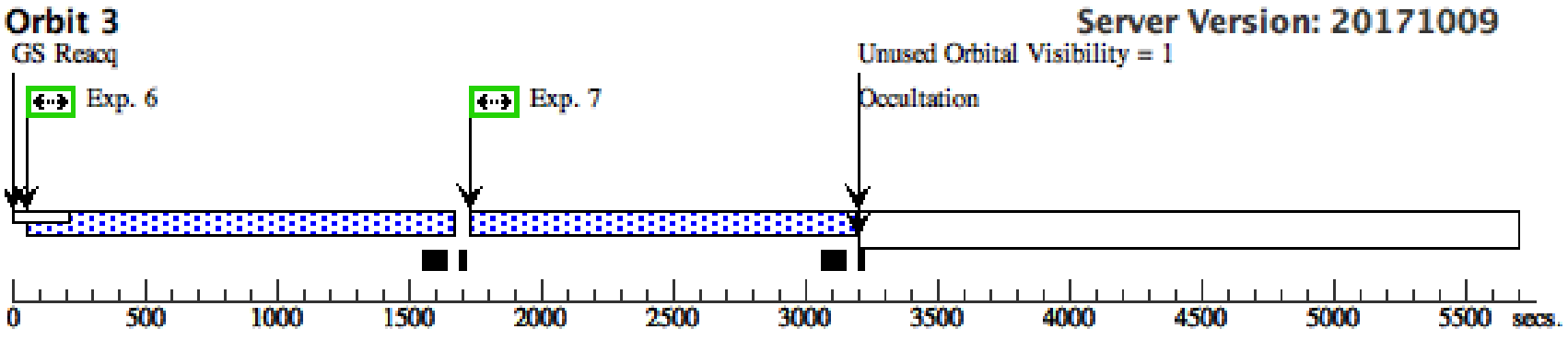
Exposures

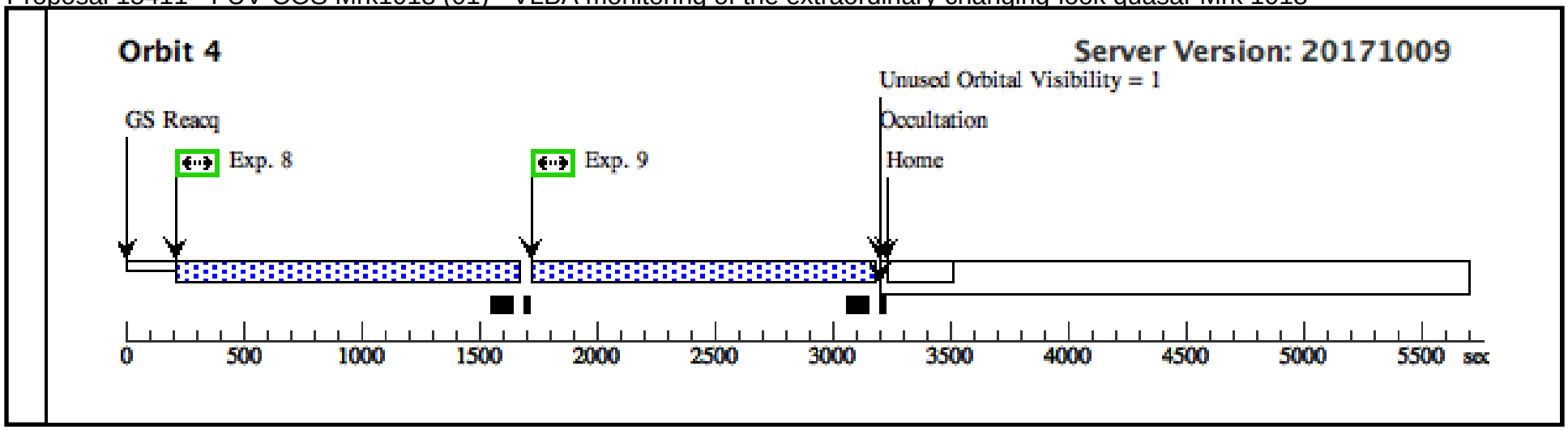
#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Acquisition Exposure (1036530)	(1) MRK-1018	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				40 Secs (40 Secs) *[==>]*	*[1]*
2	G140L Exposure 1 (FP-POS1) (839387)	(1) MRK-1018	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=1080; FLASH=YES; FP-POS=1; SEGMENT=A			1180 Secs (1180 Secs) *[==>]*	*[1]*
3	G140L Exposure 2 (FP-POS2) (839387)	(1) MRK-1018	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=1080; FLASH=YES; FP-POS=2; SEGMENT=A			1180 Secs (1180 Secs) *[==>]*	*[1]*
4	G140L Exposure 3 (FP-POS3) (839387)	(1) MRK-1018	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=1305; FLASH=YES; FP-POS=3; SEGMENT=A			1350 Secs (1405 Secs) *[==>1405.0 Secs]*	*[2]*
5	G140L Exposure 4 (FP-POS4) (839387)	(1) MRK-1018	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=1305; FLASH=YES; FP-POS=4; SEGMENT=A			1350 Secs (1405 Secs) *[==>1405.0 Secs]*	*[2]*
6	G130M Exposure 1 (1036647)	(1) MRK-1018	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=1; FLASH=YES; BUFFER-TIME=1299; SEGMENT=BOTH			1350 Secs (1404 Secs) *[==>1404.0 Secs]*	*[3]*
7	G130M Exposure 2 (1036647)	(1) MRK-1018	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=2; FLASH=YES; BUFFER-TIME=1299; SEGMENT=BOTH			1350 Secs (1404 Secs) *[==>1404.0 Secs]*	*[3]*
8	G130M Exposure 3 (1036647)	(1) MRK-1018	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=3; FLASH=YES; BUFFER-TIME=1300; SEGMENT=BOTH			1350 Secs (1405 Secs) *[==>1405.0 Secs]*	*[4]*
9	G130M Exposure 4 (1036647)	(1) MRK-1018	COS/FUV, TIME-TAG, PSA	G130M 1222 A	FP-POS=4; FLASH=YES; BUFFER-TIME=1300; SEGMENT=BOTH			1350 Secs (1405 Secs) *[==>1405.0 Secs]*	*[4]*

Orbit Structure








Orbit 4
Server Version: 20171009
Unused Orbital Visibility = 1
GS Reacq
Exp. 8
Exp. 9
Occultation
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 15411, FUV-COS Mrk1018 (02) Tue Dec 12 01:00:20 GMT 2017

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: SCHED 50%; BETWEEN 11-JUN-2018:00:00:00 AND 11-JUL-2018:00:00:00

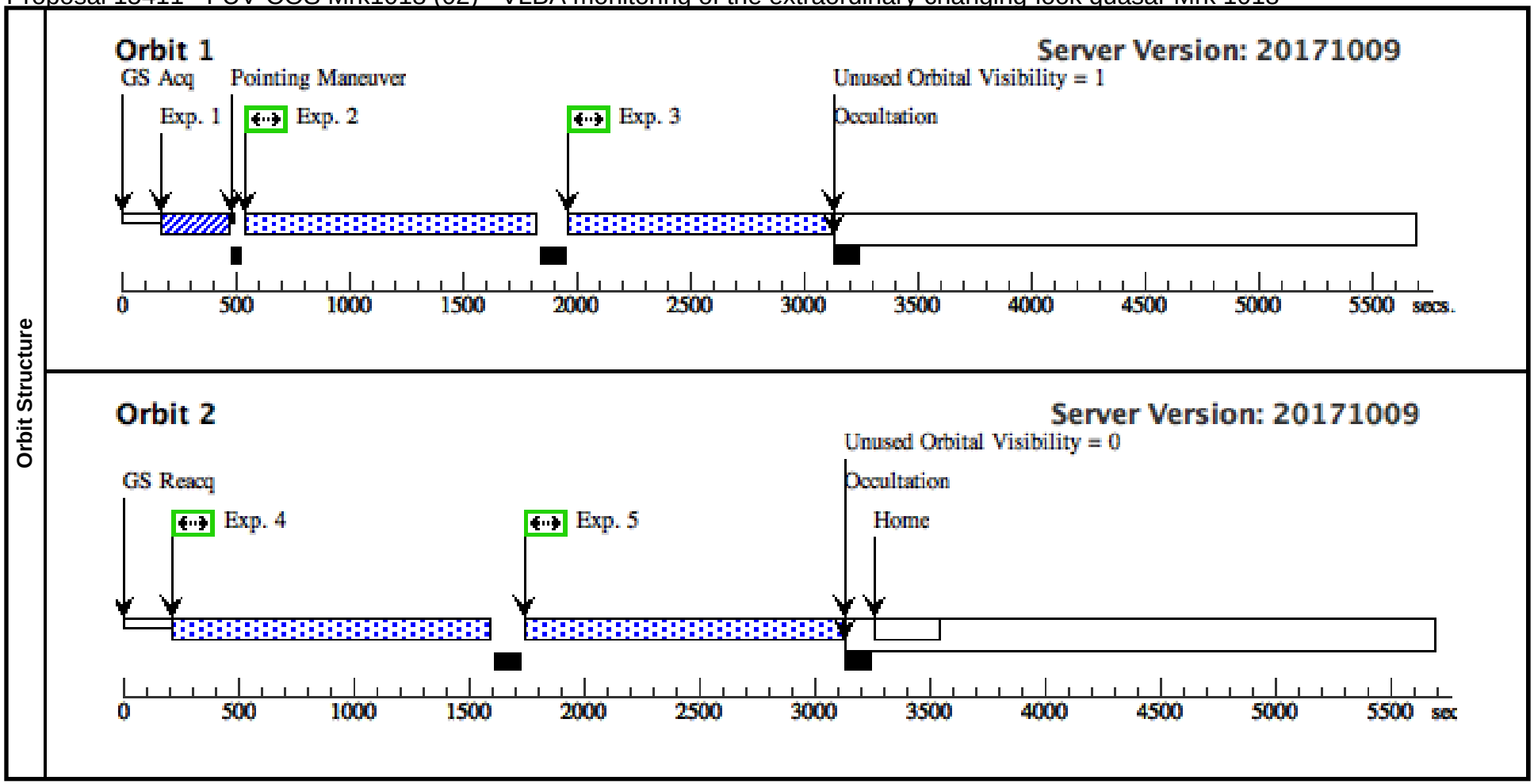
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	MRK-1018	RA: 02 06 15.9888 (31.5666200d) Dec: -00 17 29.18 (-.29144d) Equinox: J2000		V=15.0+/-0.5 300 counts/s in the 4s long COS NUV (PSA and MIRRORA) acq uisition images from Feb 2017	Reference Frame: ICRS

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database. Coordinates were then slightly adjusted on subarcsec scale to match the coordinates of previous successfull observations
Category=GALAXY
Description=[ACCRETION DISK, JET, NUCLEUS, SEYFERT]
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Acquisition Exposure (1036530)	(1) MRK-1018	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				40 Secs (40 Secs) *[==>]*	***[1]***
2	Science Exposure 1 (FP-POS1) (839387)	(1) MRK-1018	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=1070; FLASH=YES; FP-POS=1; SEGMENT=A			1180 Secs (1105 Secs) *[==>1105.0 Secs]*	***[1]***
3	Science Exposure 2 (FP-POS2) (839387)	(1) MRK-1018	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=1070; FLASH=YES; FP-POS=2; SEGMENT=A			1180 Secs (1105 Secs) *[==>1105.0 Secs]*	***[1]***
4	Science Exposure 3 (FP-POS3) (839387)	(1) MRK-1018	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=1300; FLASH=YES; FP-POS=3; SEGMENT=A			1350 Secs (1330 Secs) *[==>1330.0 Secs]*	***[2]***
5	Science Exposure 4 (FP-POS4) (839387)	(1) MRK-1018	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=1300; FLASH=YES; FP-POS=4; SEGMENT=A			1350 Secs (1330 Secs) *[==>1330.0 Secs]*	***[2]***


Orbit Structure
Orbit 1
Server Version: 20171009
GS Acq
Pointing Maneuver
Unused Orbital Visibility = 1
Exp. 1
Exp. 2
Exp. 3
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.
Orbit 2
Server Version: 20171009
Unused Orbital Visibility = 0
GS Reacq
Occultation
Exp. 4
Exp. 5
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 15411, FUV-COS Mrk1018 (03) Tue Dec 12 01:00:20 GMT 2017

Diagnostic Status: No Diagnostics

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: SCHED 50%; BETWEEN 17-AUG-2018:00:00:00 AND 14-SEP-2018:00:00:00

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	MRK-1018	RA: 02 06 15.9888 (31.5666200d) Dec: -00 17 29.18 (-.29144d) Equinox: J2000		V=15.0+/-0.5 300 counts/s in the 4s long COS NUV (PSA and MIRRORA) acq uisition images from Feb 2017	Reference Frame: ICRS

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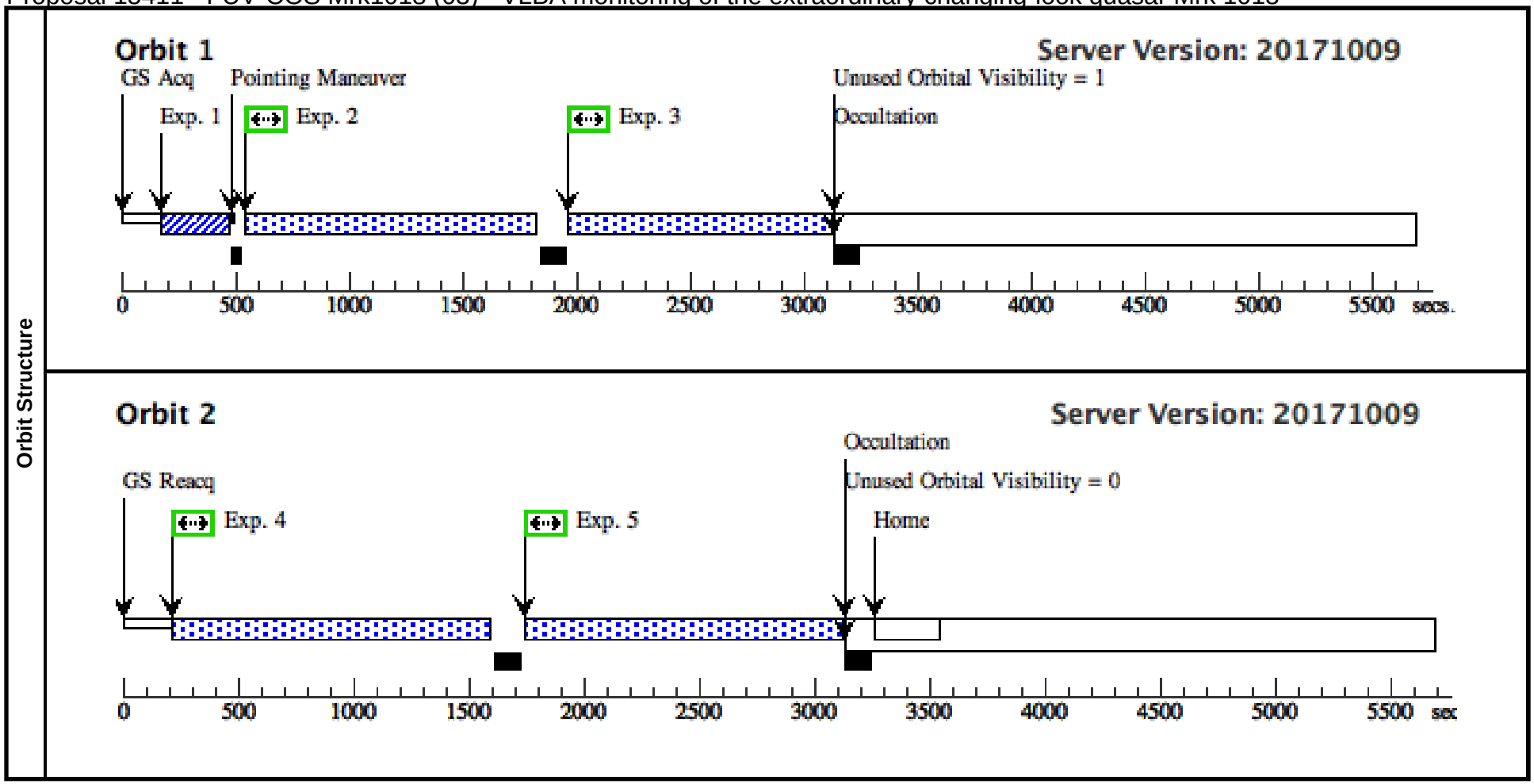
Extended=NO

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Acquisition Exposure (1036530)	(1) MRK-1018	COS/NUV, ACQ/IMAGE, PSA	MIRRORA				40 Secs (40 Secs) *[==>]*	***[1]***
2	Science Exposure 1 (FP-POS1) (839387)	(1) MRK-1018	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=1070; FLASH=YES; FP-POS=1; SEGMENT=A			1180 Secs (1105 Secs) *[==>1105.0 Secs]*	***[1]***
3	Science Exposure 2 (FP-POS2) (839387)	(1) MRK-1018	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=1070; FLASH=YES; FP-POS=2; SEGMENT=A			1180 Secs (1105 Secs) *[==>1105.0 Secs]*	***[1]***
4	Science Exposure 3 (FP-POS3) (839387)	(1) MRK-1018	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=1300; FLASH=YES; FP-POS=3; SEGMENT=A			1350 Secs (1330 Secs) *[==>1330.0 Secs]*	***[2]***
5	Science Exposure 4 (FP-POS4) (839387)	(1) MRK-1018	COS/FUV, TIME-TAG, PSA	G140L 1105 A	BUFFER-TIME=1300; FLASH=YES; FP-POS=4; SEGMENT=A			1350 Secs (1330 Secs) *[==>1330.0 Secs]*	***[2]***


Orbit Structure
Orbit 1
Server Version: 20171009
GS Acq
Pointing Maneuver
Unused Orbital Visibility = 1
Exp. 1
Exp. 2
Exp. 3
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.
Orbit 2
Server Version: 20171009
Occultation
GS Reacq
Unused Orbital Visibility = 0
Exp. 4
Exp. 5
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec