



15404 - Catching the onset of black hole activity in nearby galaxy Mrk 590

Cycle: 25, Proposal Category: GO/DD

(Availability Mode: SUPPORTED)

INVESTIGATORS

<i>Name</i>	<i>Institution</i>	<i>E-Mail</i>
Dr. Marianne Vestergaard (PI) (ESA Member) (Contact)	University of Copenhagen, Niels Bohr Institute	vester@dark-cosmology.dk
Dr. Sandra Raimundo (CoI) (ESA Member)	University of Copenhagen, Niels Bohr Institute	s.raimundo@dark-cosmology.dk
Prof. Bradley M Peterson (CoI) (AdminUSPI)	The Ohio State University	peterson.12@osu.edu
Dr. Gisella De Rosa (CoI)	Space Telescope Science Institute	gderosa@stsci.edu
Daniel P. Lawther (CoI) (ESA Member)	University of Copenhagen, Niels Bohr Institute	danielpe@dark-cosmology.dk
Dr. Jun Yi (Kevin) Koay (CoI)	Academia Sinica, Institute of Astronomy and Astrophysics	jykoay@asiaa.sinica.edu.tw

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) NGC-863	COS/FUV COS/NUV	1	09-Nov-2017 19:00:14.0	yes
02	(1) NGC-863	COS/FUV COS/NUV	1	09-Nov-2017 19:00:15.0	yes
03	(1) NGC-863	COS/FUV COS/NUV	1	09-Nov-2017 19:00:16.0	yes

3 Total Orbits Used

ABSTRACT

After a 10-year hiatus, Mrk 590 appears to be rekindling its nuclear activity! This offers a very rare opportunity to document the onset of AGN activity as it occurs that can lead to a better understanding of the long-standing issue of how AGNs are fuelled. We request a single observation as soon as possible and a five-visit ToO program triggered by the 0.3-10keV Swift X-ray flux to establish with HST/COS the amount of UV nuclear continuum and line emission at each of the 6 observing epochs, ~3 weeks apart, and thereby probe the AGN accretion state changes with time as the AGN turns on. We currently monitor Mrk 590, in response to two sudden and strong X-ray flares in Sept 2017, following previous minor flares, which indicate that the AGN may soon turn on again. We continue to monitor Mrk 590 with Swift (optical-UV-X-ray continuum), the VLBA (radio continuum) and optical ground-based telescopes. We are missing a $\sim 1000 \text{ \AA} < \lambda < \sim 2000 \text{ \AA}$ spectrum to characterize the state of the far-UV emission. We aim to establish when a thin accretion disk and the broad emission line region are re-established. Given the nature of this transitory state we cannot wait for the next GO program in Cycle 27.

These data will be combined with continuing monitoring with Swift and ground-based telescopes in order to determine the time scales and order in which the emission components appear as the central engine is being re-established.

OBSERVING DESCRIPTION

We propose to obtain COS low resolution FUV observations of the Seyfert 1 galaxy Mrk 590 to determine if the AGN thermal emission and broad emission lines have re-appeared in response to the significant increase in X-ray and far-UV emission as detected by Swift when this program is triggered. Using the G140L grating @1105 Ang we will be able to cover the Ly α 1215, NV1240, Si IV + O IV1400, C IV1549, HeII1640 and CIII]1909 broad emission lines in a single exposure. The grating resolution is adequate to resolve the typical AGN narrow emission components; the width of the [O III]5007 narrow line is FWHM \sim 400 km s $^{-1}$.

As explained in the Phase I, the target has been closely monitored with SWIFT, and in the past 80 days UVW2 fluxes (centroid wavelength 1928) have varied from a minimum of $\sim 2.2 \times 10^{-15} \text{ erg s}^{-1} \text{ cm}^{-2} \text{ \AA}^{-1}$ to a max of $\sim 4.0 \text{ erg s}^{-1} \text{ cm}^{-2} \text{ \AA}^{-1}$.

Note: the target has already been successfully observed in the same configurations during faint state (PID 13518)

ACQUISITION: The target has precise 2MASS coordinates (ICRS reproduced with an error $< 0.1''$). We plan to use ACQ/IMG NUV MIRRORB and an exp time of 140s. For our ETC calculations we assume a flat continuum in fl normalized to half of the min observed UVW2 flux $f_1 \sim 1.1 \times 10^{-15}$

Proposal 15404 (STScI Edit Number: 0, Created: Thursday, November 9, 2017 7:00:17 PM EST) - Overview

erg s-1 cm-2 Ang-1 @1928 Ang (<http://etc.stsci.edu/etc/results/COS.ta.1030198/>). This will ensure acquisition in case of "faint" state. The source will not pose a threat to the detector even if it ends up being 5 times more luminous than the max detected in the past 80 days (<http://etc.stsci.edu/etc/results/COS.ta.1030199/>).

SCIENCE: We use the G140L grating at 1105Ang with FP_POS=ALL. For ETC calculations we assume a flat continuum normalized to the mean observed UVW2 flux in the past 80 days (<http://etc.stsci.edu/etc/results/COS.sp.1030204/>). Buffer time is set to 2/3 of the ETC buffer time. The source will not pose a threat to the detector even if it ends up being 5 times more luminous than the past 80 days (<http://etc.stsci.edu/etc/results/COS.sp.1030205/>).

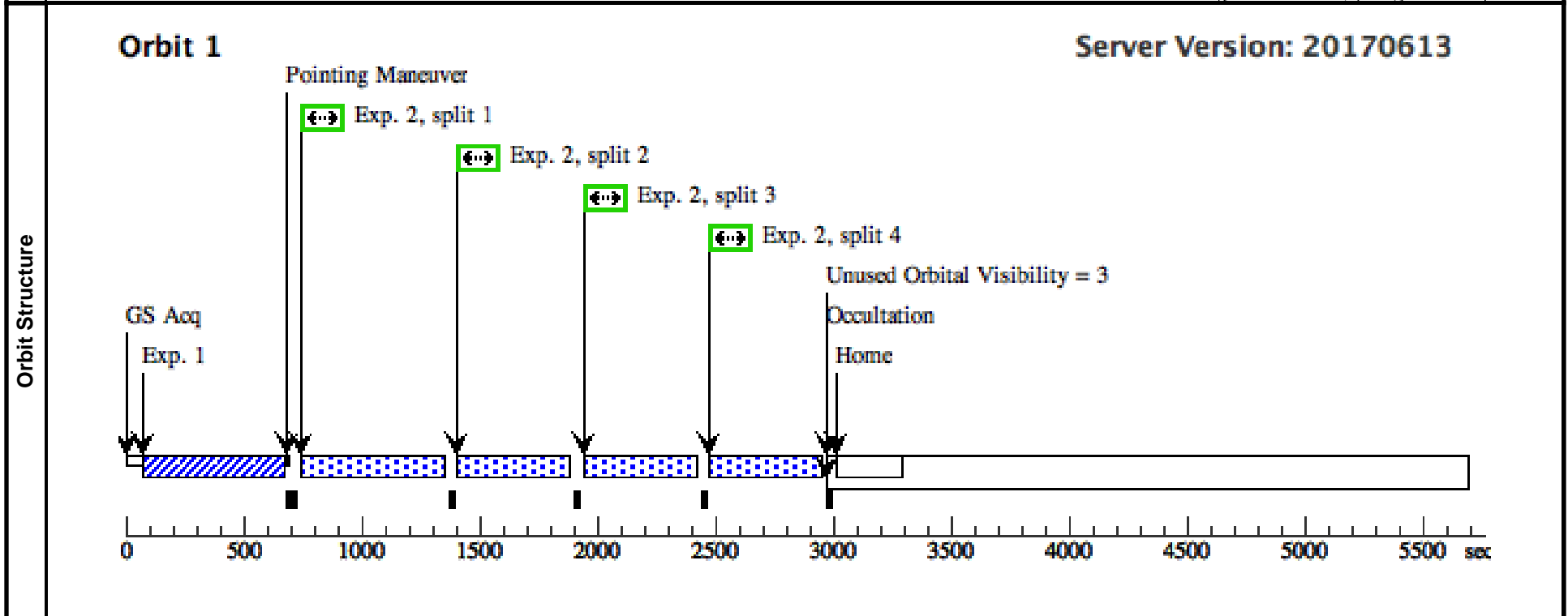
Proposal 15404 - Visit 01 - Catching the onset of black hole activity in nearby galaxy Mrk 590

Fri Nov 10 00:00:17 GMT 2017

Visit	Proposal 15404, Visit 01, completed				
	Diagnostic Status: No Diagnostics				
	Scientific Instruments: COS/FUV, COS/NUV				
	Special Requirements: SCHED 100%				

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	NGC-863	RA: 02 14 33.5790 (33.6399125d) Dec: -00 46 0.28 (-.76674d) Equinox: J2000		V=13.81 UM2=3.5 erg s-1 cm-2 Ang-1 (p ivot wavelength 2246 ang)	Reference Frame: ICRS
	<i>Comments: The source has been monitored with SWIFT, information sent to cs. Extended=NO</i>					

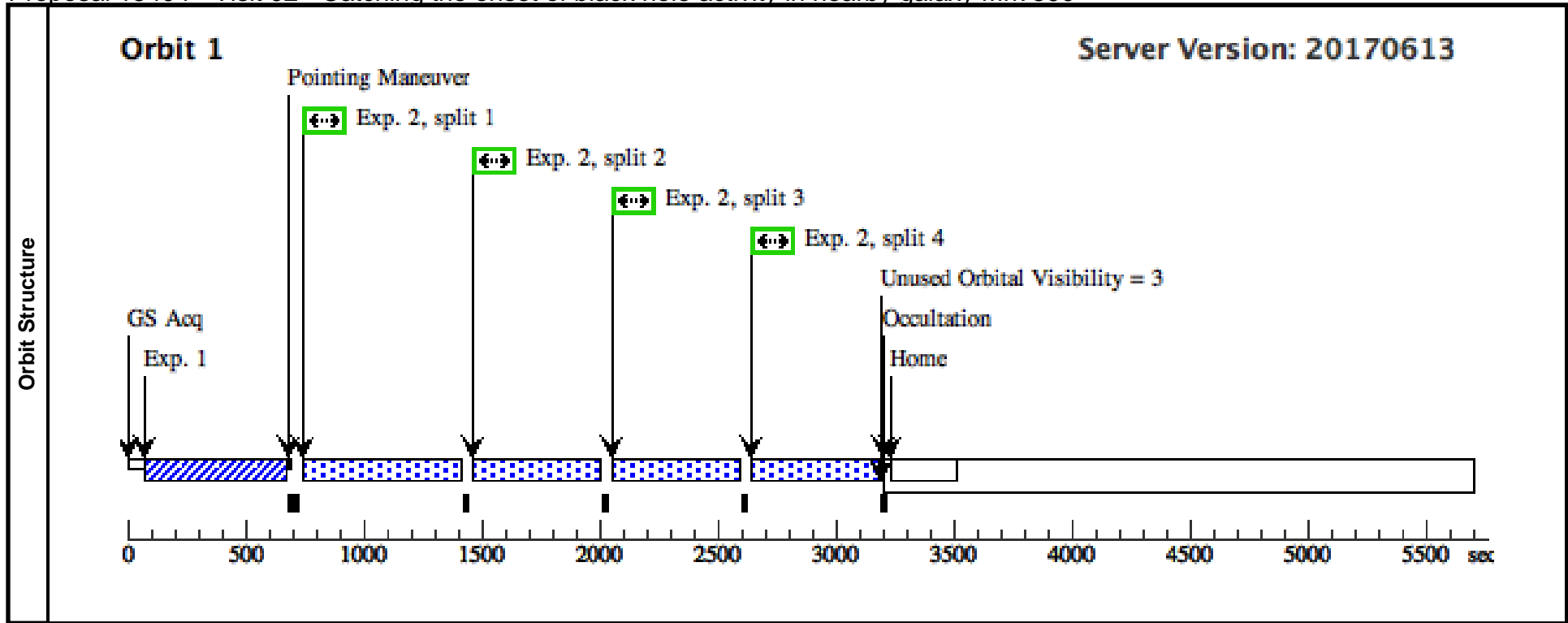
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	NUV MIRR OR B ACQ (COS.ta.103 0198)	(1) NGC-863	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				140 Secs (140 Secs) [==>]	[1]
	2	FUV G140L /1105 Scienc e (COS.sp.103 0204)	(1) NGC-863	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=ALL; BUFFER-TIME=50 00			474 Secs (1720 Secs) [==>430.0 Secs (Split 1)] [==>430.0 Secs (Split 2)] [==>430.0 Secs (Split 3)] [==>430.0 Secs (Split 4)]	[1]



Proposal 15404 - Visit 02 - Catching the onset of black hole activity in nearby galaxy Mrk 590

Fri Nov 10 00:00:17 GMT 2017

Visit	Proposal 15404, Visit 02, implementation Diagnostic Status: No Diagnostics Scientific Instruments: COS/FUV, COS/NUV Special Requirements: ON HOLD <i>On Hold Comments: Waiting for the trigger from Swift X-ray monitoring that is currently undertaken. PI will trigger the observation on the program website when relevant. We kindly ask for this visit to be scheduled as soon as is possible after the trigger.</i>									
	Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous			
		(1)	NGC-863	RA: 02 14 33.5790 (33.6399125d) Dec: -00 46 0.28 (-.76674d) Equinox: J2000		V=13.81 UM2=3.5 erg s-1 cm-2 Ang-1 (p ivot wavelength 2246 ang)	Reference Frame: ICRS			
	<i>Comments: The source has been monitored with SWIFT, information sent to cs. Extended=NO</i>									
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	NUV MIRR OR B ACQ (COS.ta.103 0198)	(1) NGC-863	COS/NUV, ACQ/IMAGE, PSA	MIRRORB					140 Secs (140 Secs) [==>]
2	FUV G140L /1105 Scienc e (COS.sp.103 0204)	(1) NGC-863	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=ALL; BUFFER-TIME=50 00				474 Secs (1944 Secs) [==>486.0 Secs (Split 1)] [==>486.0 Secs (Split 2)] [==>486.0 Secs (Split 3)] [==>486.0 Secs (Split 4)]	[1]



Proposal 15404 - Visit 03 - Catching the onset of black hole activity in nearby galaxy Mrk 590

Fri Nov 10 00:00:17 GMT 2017

Visit	Proposal 15404, Visit 03, implementation Diagnostic Status: Warning Scientific Instruments: COS/FUV, COS/NUV Special Requirements: AFTER 02 BY 5 D TO 28 D; ON HOLD FOR 02 <i>On Hold Comments: This visit should occur as soon as possible after 5 days from visit 02 (visit 02 is triggered). However, a time frame up to 28 days is acceptable. Any later and the science goals cannot be achieved.</i>									
	(Visit 03) Warning (Form): For a visit On Hold For another, a minimum separation of less than 17.0 Days is disruptive and requires permission from your program coordinator. (The minimum should allow time to receive/analyze the data, and rewrite/resubmit/reschedule the visit.)									
Diagnostics										
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	NGC-863	RA: 02 14 33.5790 (33.6399125d) Dec: -00 46 0.28 (-.76674d) Equinox: J2000		V=13.81 UM2=3.5 erg s-1 cm-2 Ang-1 (p ivot wavelength 2246 ang)	Reference Frame: ICRS				
<i>Comments: The source has been monitored with SWIFT, information sent to cs. Extended=NO</i>										
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	NUV MIRR OR B ACQ (COS.ta.103 0198)	(1) NGC-863	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				140 Secs (140 Secs) [==>]	[1]
	2	FUV G140L /1105 Scienc e (COS.sp.103 0204)	(1) NGC-863	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=ALL; BUFFER-TIME=50 00			474 Secs (1944 Secs) [==>486.0 Secs (Split 1)] [==>486.0 Secs (Split 2)] [==>486.0 Secs (Split 3)] [==>486.0 Secs (Split 4)]	[1]

