



16417 - Constraining the threshold luminosity limit for broad line production in AGN

Cycle: 27, Proposal Category: GO/DD

(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) NGC-863	COS/FUV COS/NUV	1	20-Jul-2020 11:00:11.0	yes

1 Total Orbits Used

ABSTRACT

Mrk 590 is a changing-look AGN that is currently in an unusual low flux state, after several years of flaring.

This offers a very rare opportunity to constrain the unknown threshold ionizing luminosity required for production of broad emission lines in AGN, something that is very difficult to do unless the target and conditions are just right. Given the stochastic nature of black hole accretion and the past

history of strong flares this program cannot wait for the next Cycle.

We propose to obtain a 1-orbit COS spectrum of Mrk 590 now (non-disruptive, within the normal ~ 3 week turn around time scale) to test for the presence of broad UV emission lines. We will measure UV broad-line fluxes (or upper limits) and constrain the UV-EUV continuum emission from the accretion disk. By combining these measurements and previous observations of this target we will constrain the threshold ionizing luminosity required for broad-line production. This allows us to test existing theoretical models of broad line production.

This HST program is part of a larger ongoing campaign with Swift, NuSTAR, XMM and VLT to provide a comprehensive account of the accretion state changes during the early onset of AGN activity as the AGN builds up. These HST/COS data will contribute with unique information to the legacy database on this intriguing object that will undoubtedly spawn new insight on AGN physics and the changing-look AGN phenomenon.

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 are present at the current X-ray level as detected by Swift. 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 ~ 400 km s $^{-1}$.

As explained in the Phase I, the target has been closely monitored with SWIFT. The latest UVW2 flux (centroid wavelength 1928), obtained on July 15th 2020, is equal to $\sim 2.4 \times 10^{-15}$ erg s $^{-1}$ cm $^{-2}$ Ang $^{-1}$.

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 70 s. For our ETC calculations we assume a flat continuum in f $_1$ normalized to the min observed UVW2 flux since 2014 f $_1 \sim 6.5 \times 10^{-16}$ erg s $^{-1}$ cm $^{-2}$ Ang $^{-1}$ @1928 Ang (<http://etc.stsci.edu/etc/results/COS.ta.1456009/>). 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 2 times more luminous than the max detected in the past 10 years f $_1 \sim 8.4 \times 10^{-15}$ erg s $^{-1}$ cm $^{-2}$ Ang $^{-1}$ @1928 Ang (<http://etc.stsci.edu/etc/results/COS.ta.1456018/>).

Proposal 16417 (STScI Edit Number: 0, Created: Monday, July 20, 2020 at 10:00:11 AM Eastern Standard Time) - Overview

SCIENCE: We use the G140L grating at 1105Å with FP_POS=ALL. For ETC calculations we assume a QSO FOS template, redshifted to $z=0.02609$ and normalized to the observed UVW2 flux in July 2020 (<http://etc.stsci.edu/etc/results/COS.sp.1456015/>). 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 2 times more luminous than the max detected in the past 10 years $f_1 \sim 8.4e-15 \text{ erg s}^{-1} \text{ cm}^{-2} \text{ Å}^{-1}$ @1928 Å (<http://etc.stsci.edu/etc/results/COS.sp.1456016/>).

Proposal 16417 - Visit 01 - Mrk 590 (01) - Constraining the threshold luminosity limit for broad line production in AGN

Mon Jul 20 15:00:12 GMT 2020

Visit	Proposal 16417, Visit 01 - Mrk 590 (01)				
	Diagnostic Status: No Diagnostics				
	Scientific Instruments: COS/FUV, COS/NUV				
	Special Requirements: (none)				
<i>Comments: COS FUV spectrum</i>					

#	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 AGN V-band magnitude is currently 14.8mag	Reference Frame: ICRS
<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i>					
<i>Category=GALAXY</i>					
<i>Description=[ACCRETION DISK, BLR, NUCLEUS, SEYFERT]</i>					
<i>Extended=NO</i>					

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	NUV MIRROR B ACQ (COS.ta.145 6009)	(1) NGC-863	COS/NUV, ACQ/IMAGE, PSA	MIRRORB				70 Secs (70 Secs) [=>]	[1]
2	FUV G140L /1105 Science (COS.sp.145 6015)	(1) NGC-863	COS/FUV, TIME-TAG, PSA	G140L 1105 A	FP-POS=ALL; BUFFER-TIME=3900			474 Secs (1940 Secs) [=>485.0 Secs (Split 1)] [=>485.0 Secs (Split 2)] [=>485.0 Secs (Split 3)] [=>485.0 Secs (Split 4)]	[1]

