



13512 - The curious case of Mrk~590

Cycle: 21, 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) NGC-863	COS/NUV	2	08-Oct-2014 21:02:58.0	yes

2 Total Orbits Used

ABSTRACT

Mrk 590 is presently in an unusual state. Its soft-excess has disappeared, its broad emission lines have disappeared, and it shows the presence of a relativistic outflow. All these observations could be related to each other and perhaps the underlying cause is a low accretion rate relative to Eddington. Our proposed observations with Chandra and HST will not only help to understand the curious case of Mrk 590, but also to answer some long-standing questions in AGN physics: What is the origin of the soft-excess?; What is the origin of the broad emission line region?; What is the launching mechanism of outflows? Mrk 590 provides us with an unique opportunity to find the underlying physics related to these apparently disparate phenomena.

OBSERVING DESCRIPTION

We have been awarded two HST orbits to observe Mrk 590 with COS. The target has been in an unusually low state lately. We recently observed the CIV region of the Mrk 590 spectrum with COS G140L using DD time during Period 20 (2013 June 17; PID 13185), i.e., the same setup as our original plan for observations for PID 13512. With this observation, we were able to compare the current UV spectrum to past IUE SWP observations and found a drastic change in the CIV and Ly α emission line properties since the 1990's. This is consistent with the changes we've observed in the optical and X-ray spectrum. While the optical emission line changes have been drastic over the past few decades, there has been little change in the past year. Therefore, it is a much stronger science case to go after another emission line region (MgII) with our present allocation of two orbits than to re-observe the CIV region, where likely little change will be observed over the short time period between our planned observation and the 2013 June observation. MgII is the only other prominent emission line in AGN spectra that we have yet to observe in the current, low state of Mrk 590. The MgII region is additionally interesting because not only do IUE LWP data exist from 1982 and 1991 that cover this region and make possible a comparison of the MgII profile when Mrk 590 was in its previous high state, but a recent publication by Roig et al. (2014, ApJ, 781, 72) finds an interesting sample of objects from the SDSS that shows no broad emission component of the H β emission line, but a remaining broad component of MgII. If Mrk 590 shows similar spectral properties, it could shed light on this new "class" of objects discussed by Roig et al.

With the G230L/cenwave=2950 setting we are able to cover adequately the MgII line region. We are choosing the low resolution grating over the medium resolution gratings to maximize the S/N of the observation, which is the major concern given the low flux of the target ($f_{\lambda} \sim 2.5 \times 10^{-16}$ cgs at 1850Å). Moreover, the setup is partially overlapping with the 2013 DDT observation, so while we will not observe the CIV or Ly α emission lines again, we will be able to look for any changes in the underlying continuum luminosity, which will still allow a constraint on the change over the past year.

We base our ETC calculations on the COS DDT observations from June 2013, where we detected a continuum flux of $f_{\lambda} \sim 2.5 \times 10^{-16}$ erg s $^{-1}$ cm $^{-2}$ Å $^{-1}$ @ 1850 Å. After performing NUV acquisition with MIRRORA (ACQ/IMAGE), we fill the orbits with 4 exposures G230L/cenwave=2950 (one for each FP-POS), getting an overall continuum S/N $\sim$ 5.5 per resel @ 1850 Å.

Proposal 13512 - Visit 01 - The curious case of Mrk~590

Visit	Proposal 13512, Visit 01, implementation										Thu Oct 09 01:03:00 GMT 2014
	Diagnostic Status: No Diagnostics										
	Scientific Instruments: COS/NUV										
	Special Requirements: (none)										
	Comments: The HST and Chandra observations should be performed within 10 days of each other.										
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(1)	NGC-863	RA: 02 14 33.5790 (33.6399125d)		Redshift: 0.026		V=13.81		Reference Frame: ICRS		
		Alt Name1: MRK590	Dec: -00 46 0.28 (-.76674d)								
			Equinox: J2000								
	Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.										
Exposures	#	Label (ETC Run)	Target	Config,Mode,Aperture		Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(COS.ta.639 709)	(1) NGC-863	COS/NUV, ACQ/IMAGE, PSA		MIRRORA		GS ACQ SCENARI O BASE1B3		30 Secs (30 Secs)	
										[==>]	[1]
	Comments: In a recent HST observation with COS G140L the flux was observed to be 2.5e-16 at 1850 Ang.										
	2	(COS.sp.639 713)	(1) NGC-863	COS/NUV, TIME-TAG, PSA		G230L 2950 A	BUFFER-TIME=11 39; FP-POS=1			1249 Secs (1249 Secs)	
										[==>]	[1]
	Comments: In a recent HST observation with COS G140L the flux was observed to be 2.5e-16 at 1850 Ang.										
	3	(COS.sp.639 713)	(1) NGC-863	COS/NUV, TIME-TAG, PSA		G230L 2950 A	BUFFER-TIME=11 40; FP-POS=2			1250 Secs (1250 Secs)	
										[==>]	[1]
	Comments: In a recent HST observation with COS G140L the flux was observed to be 2.5e-16 at 1850 Ang.										
	4	(COS.sp.639 714)	(1) NGC-863	COS/NUV, TIME-TAG, PSA		G230L 2950 A	BUFFER-TIME=13 40; FP-POS=3			1450 Secs (1450 Secs)	
									[==>]	[2]	
Comments: In a recent HST observation with COS G140L the flux was observed to be 2.5e-16 at 1850 Ang.											
5	(COS.sp.639 714)	(1) NGC-863	COS/NUV, TIME-TAG, PSA		G230L 2950 A	BUFFER-TIME=13 45; FP-POS=4			1455 Secs (1455 Secs)		
									[==>]	[2]	
Comments: In a recent HST observation with COS G140L the flux was observed to be 2.5e-16 at 1850 Ang.											

