



14885 - Monitoring the Extraordinary Transient Outflow in the Quasar PG1411+442

Cycle: 24, Proposal Category: GO

(UV Initiative)

(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) 2XMM-J141348.3+440014	COS/FUV COS/NUV	3	14-Dec-2016 21:02:22.0	yes

3 Total Orbits Used

ABSTRACT

Quasar outflows are fundamental components of quasar environments and they might play an important role in feedback to host galaxy evolution. We obtained HST-COS spectra of a known outflow "mini-BAL" quasar, PG1411+442 (redshift = 0.089) in February 2015 that revealed the remarkable emergence of a unique new transient outflow that produces hundreds of weak absorption lines across rest-frame UV. This include FeII* transitions from excited states up to 3.9eV above ground, unusual lines of NiII*, OI*, CI*, and NI*, plus absorption in HeI* 5876, NaI D, and the HI* Balmer lines in the visible, at velocity shifts $v \sim 1900$ km/s and widths of only FWHM ~ 100 -150 km/s. These features identify a very dense

($n_H > 10^7 \text{ cm}^{-3}$) and small outflow structure (covering $\sim 20\%$ of the quasar continuum source) with an enormous column density $N_H > 10^{23} \text{ cm}^{-2}$. Followup HST-COS observations in April 2016 show that the outflow is evolving rapidly, probably due to the outflow structure crossing our lines of sight at high speeds ($> 1000 \text{ km/s}$). This unique extreme transient absorber represents a new phenomenon in quasar research that might offer important clues to the general nature of quasar outflows and their interactions with the host galaxies.

We request 3 orbits with COS/FUV to monitor the evolution of the remarkable transient outflow in PG1411+442. These observations are urgent because rapid changes are occurring and measurements of the variability on short timescales are important to determine its location, energetics and physical nature of this outflow. We did not submit a normal cycle 24 proposal because the April 2016 data, needed to inform this request, came after the submission deadline.

OBSERVING DESCRIPTION

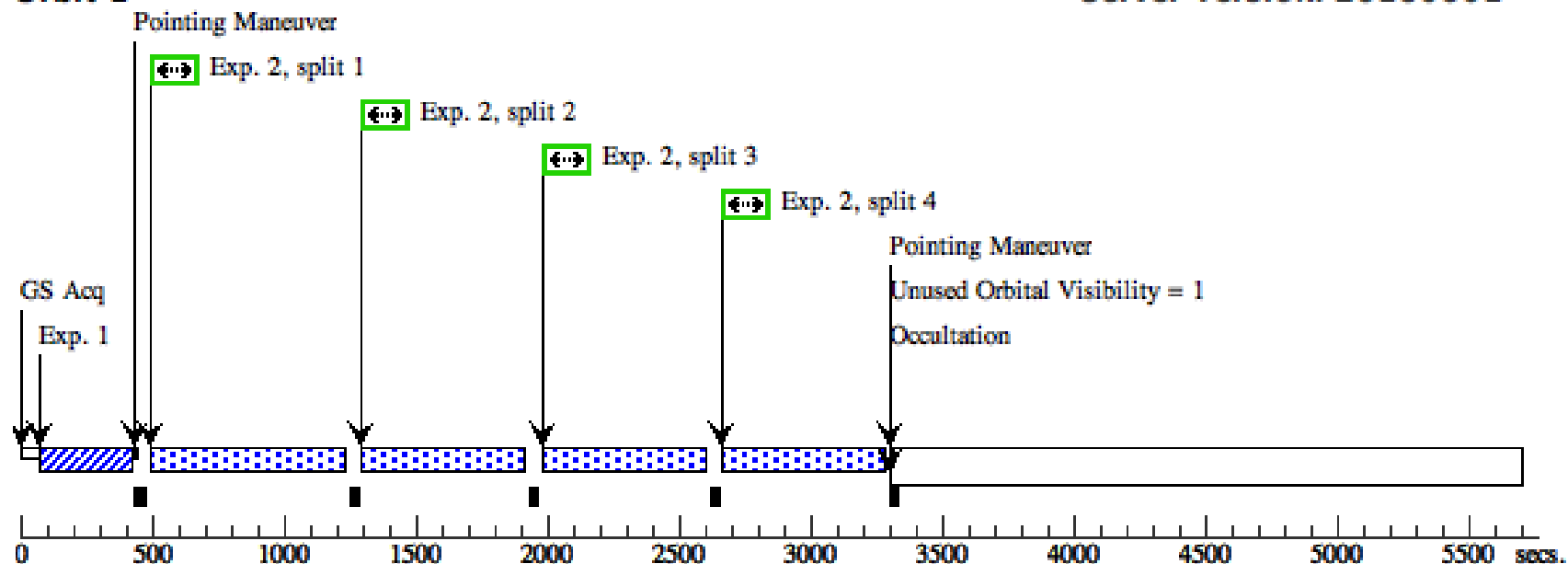
We will use 3 orbits with COS FUV to observe PG1411+442 in a way that duplicates our successful Cycle 21 and 23 observations of this source (in February 2015 and April 2016). This includes 1 orbit with G130M-1096 to cover rest-frame wavelengths 1000-1236Å, 1 orbit with G130M-1309 to cover 1153-1449Å, and 1 orbit with G160M-1589 to cover 1398-1761Å. We note that our Cycle 21 program used 2 orbits with G130M-1096 for a total of 4 orbits to measure broad lines in the BAL-like outflow in an observed wavelength range 940-1060Å with very low sensitivity. The ripples are not detectable at those wavelengths even with 2 orbits because of low signal-to-noise. Thus we requested only 1 orbit with G130M-1096 here and in cycle 23 because it is more economical and sufficient to measure the ripples and BAL-like features both at wavelengths 1000-1236Å. We performed extensive ETC calculations using these settings for our original Cycle 21 proposal. Here we note simply that the feasibility of the observations now proposed is demonstrated by the high-quality spectra we already obtained.

Proposal 14885 - Visit 01 - Monitoring the Extraordinary Transient Outflow in the Quasar PG1411+442

Visit	Proposal 14885, Visit 01										Thu Dec 15 02:02:23 GMT 2016						
	Diagnostic Status: Warning																
	Scientific Instruments: COS/FUV, COS/NUV																
	Special Requirements: (none)																
Diagnostics	(Exposure 1 (Visit 01)) Warning (Form): Sensitive exposures should have an ETC run number provided.																
	(Exposure 2 (Visit 01)) Warning (Form): Sensitive exposures should have an ETC run number provided.																
	(Exposure 3 (Visit 01)) Warning (Form): Sensitive exposures should have an ETC run number provided.																
	(Exposure 4 (Visit 01)) Warning (Form): Sensitive exposures should have an ETC run number provided.																
Fixed Targets	#	Name	Target Coordinates			Targ. Coord. Corrections			Fluxes		Miscellaneous						
	(1)	2XMM-J141348.3+440014	RA: 14 13 48.3291 (213.4513713d) Dec: +44 00 14.09 (44.00391d) Equinox: J2000						V=14.99		Reference Frame: ICRS						
	Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.																
	Extended=NO																
Exposures	#	Label	Target	Config,Mode,Aperture		Spectral Els.		Opt. Params.		Special Reqs.		Groups		Exp. Time (Total)/[Actual Dur.]		Orbit	
	1		(1) 2XMM-J141348.3+440014	COS/NUV, ACQ/IMAGE, PSA		MIRRORB								16 Secs (16 Secs)			
														[==>]			
	2		(1) 2XMM-J141348.3+440014	COS/FUV, TIME-TAG, PSA		G130M 1309 A		BUFFER-TIME=26 11; FP-POS=ALL				570 Secs (2280 Secs)		[1]			
	3		(1) 2XMM-J141348.3+440014	COS/FUV, TIME-TAG, PSA		G130M 1096 A		BUFFER-TIME=62 05; FP-POS=ALL				676 Secs (2704 Secs)		[2]			
	4		(1) 2XMM-J141348.3+440014	COS/FUV, TIME-TAG, PSA		G160M 1589 A		BUFFER-TIME=60 37; FP-POS=ALL				670 Secs (2680 Secs)		[3]			

Orbit 1

Server Version: 20160601



Orbit 2

Server Version: 20160601

