14460 - A Remarkable New Transient Outflow in the Quasar PG1411+442

Cycle: 23, Proposal Category: GO

(UV Initiative)

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Prof. Frederick Hamann (PI) (Contact)	**University of Florida**	**fhamann@ufl.edu**
Prof. David Rupke (CoI)	Rhodes College	rupked@rhodes.edu
Prof. Todd Tripp (CoI)	University of Massachusetts - Amherst	tripp@astro.umass.edu
Prof. Sylvain Veilleux (CoI)	University of Maryland	veilleux@astro.umd.edu

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) 2XMM-J141348.3+440014	COS/FUV COS/NUV	3	04-Dec-2015 21:18:29.0	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 absorber that produces MANY weak blended ripple distortions in the rest-frame UV. Our initial skepticism about the reality of these ripples and failed attempts to identify them led to missing the normal Cycle 23 deadline for followup observations. However, subsequent visible spectroscopy with Gemini GMOS (July 2015) confirmed the outflow nature of the ripples by clearly showing many more similar rare/unique absorption features such as the HI Balmer lines, Na I, and highly excited-state lines of FeII and HeI. These lines have velocity shifts v ~ 1900 km/s and widths of only FWHM ~ 170 km/s. Altogether, these lines and the UV ripples identify a small outflow

structure (covering only ~20% of the quasar continuum source) that is mostly neutral/low-ionization gas with an enormous column density of N_H > 10^23 cm^-2. 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 there might be rapid evolution and short-term constraints on the absorber variability are important to understand its location, energetics and physical nature.

OBSERVING DESCRIPTION

We will use 3 orbits with COS FUV to observe PG1411+442 in a way that duplicates our successful Cycle 21 observations of this source in February 2015. This includes 1 orbit with G130M-1096 to cover rest-frame wavelengths 1000-1236A, 1 orbit with G130M- 1309 to cover 1153-1449A, and 1 orbit with G160M-1589 to cover 1398-1761A. 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 940-1060A with very low sensitivity. The ripples are not detectable at those wavelengths even with 2 orbits because of low signal-to-noise. Thus we request only 1 orbit with G130M-1096 because it is more economical and sufficient to measure the ripples and BAL-like features both at wavelengths 1000-1236A. We performed extensive ETC calculations using these setting 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 in February 2015.

Visit

Proposal 14460, Visit 01 Sat Dec 05 02:18:31 GMT 2015

Diagnostic Status: Warning

Scientific Instruments: COS/FUV, COS/NUV

Special Requirements: (none)

Comments: MirrorB

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

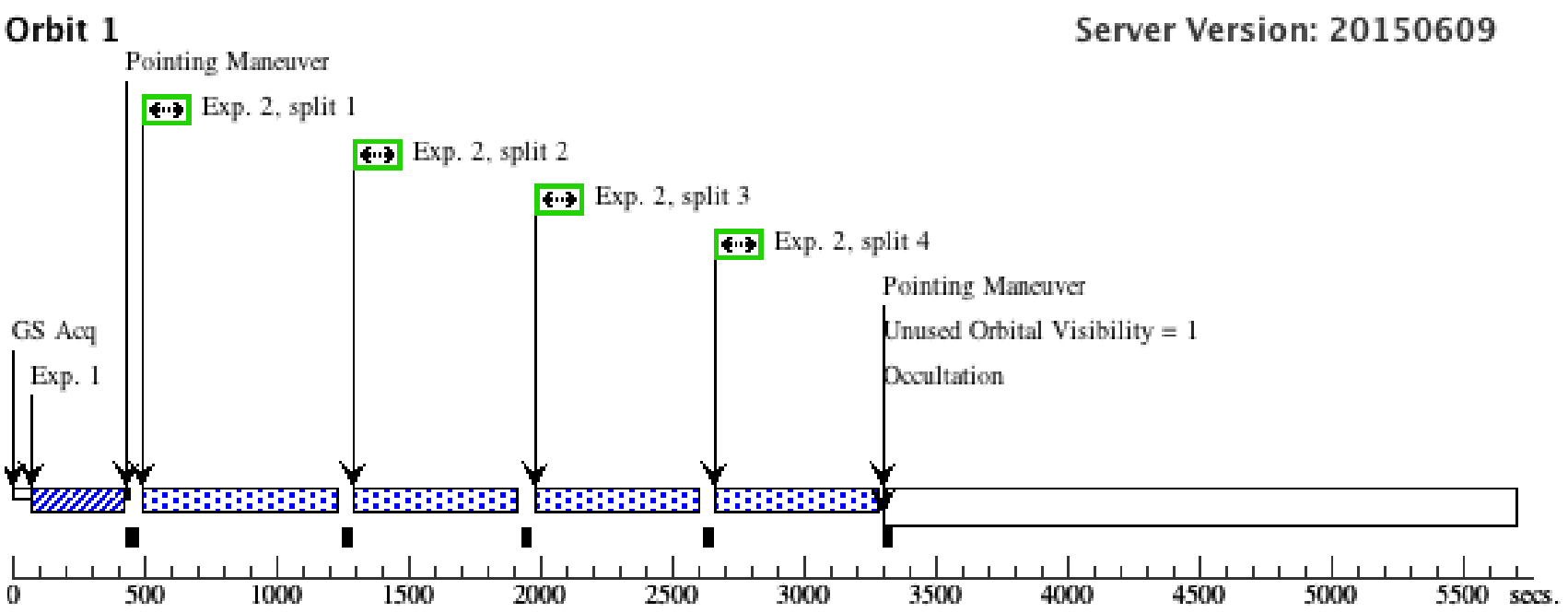
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	2XMM-J141348.3+440014	RA: 14 13 48.3291 (213.4513713d) Dec: +44 00 14.09 (44.00391d) Equinox: J2000		V=14.99	Reference Frame: ICRS

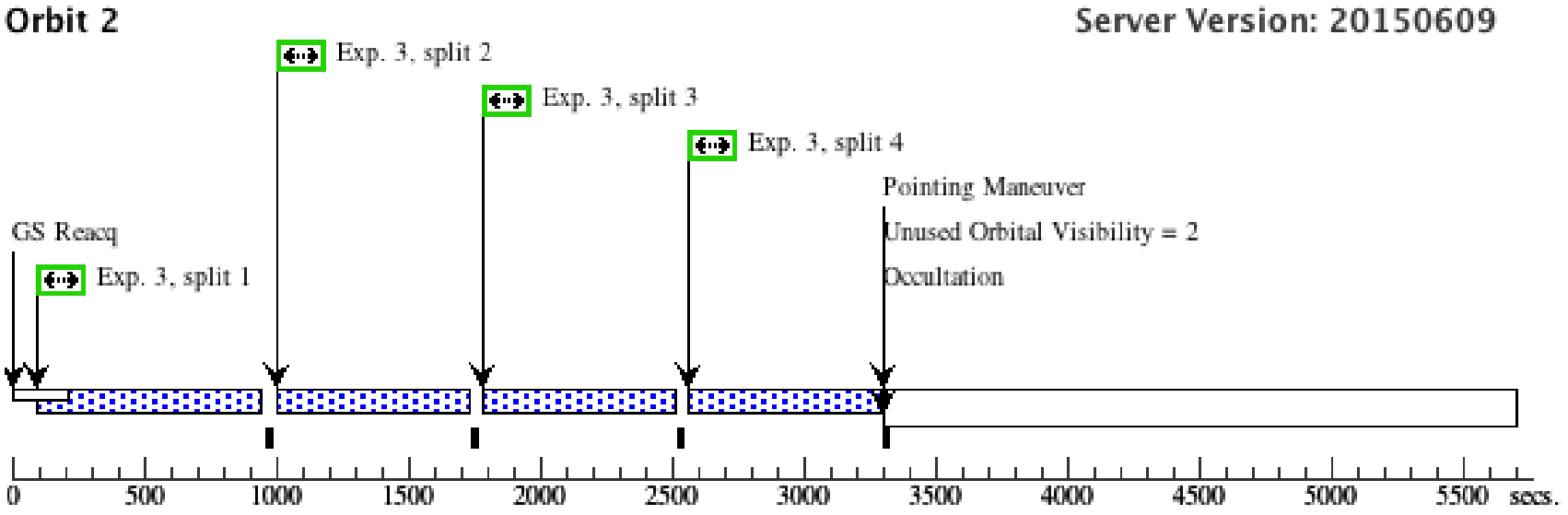
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Extended=NO

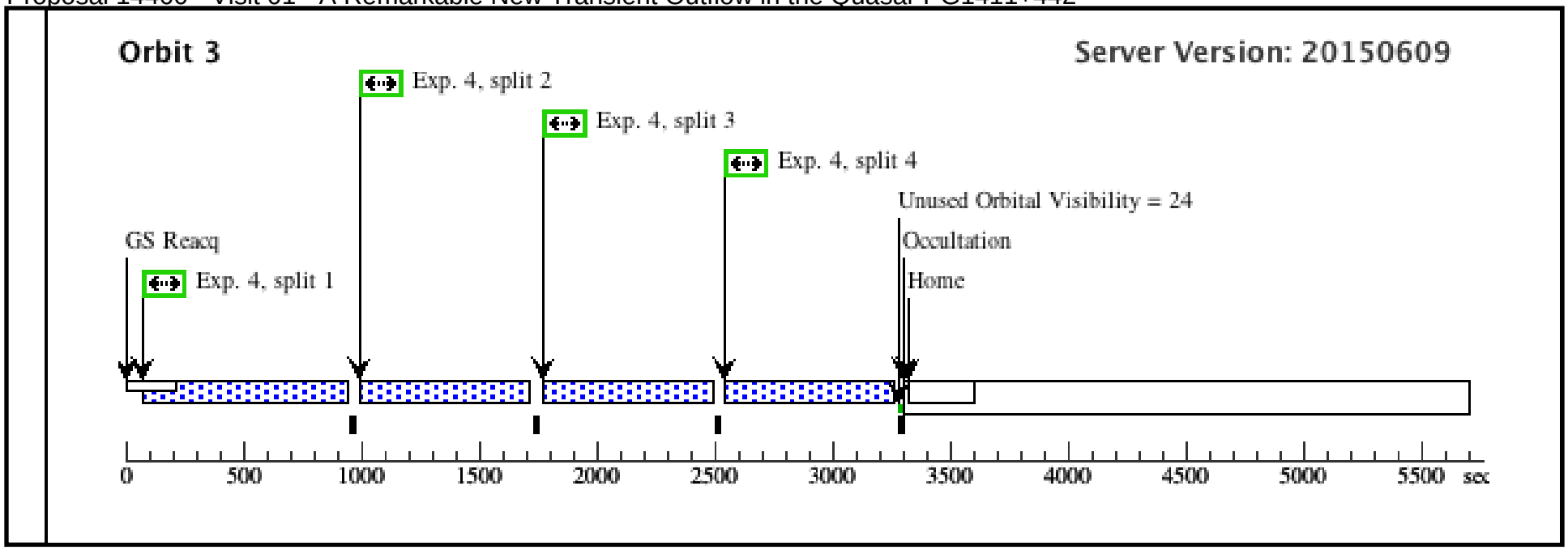
Exposures

#	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)	
								[==>]	***[1]***
2		(1) 2XMM-J141348.3+440014	COS/FUV, TIME-TAG, PSA	G130M 1309 A	BUFFER-TIME=2611; FP-POS=ALL			570 Secs (2280 Secs)	
								[==>(Split 1)] *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	***[1]***
3		(1) 2XMM-J141348.3+440014	COS/FUV, TIME-TAG, PSA	G130M 1096 A	BUFFER-TIME=6205; FP-POS=ALL			676 Secs (2704 Secs)	
								[==>(Split 1)] *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	***[2]***
4		(1) 2XMM-J141348.3+440014	COS/FUV, TIME-TAG, PSA	G160M 1589 A	BUFFER-TIME=6037; FP-POS=ALL			670 Secs (2680 Secs)	
								[==>(Split 1)] *[==>(Split 2)]* *[==>(Split 3)]* *[==>(Split 4)]*	***[3]***

Orbit Structure






Orbit 3
Server Version: 20150609
Exp. 4, split 2
Exp. 4, split 3
Exp. 4, split 4
Unused Orbital Visibility = 24
GS Reacq
Occultation
Exp. 4, split 1
Home
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec