10541 - Probing the jet mattter content of quasar PKS 0637-752

Cycle: 14, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

Visit	*Targets*	*Configurations*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) PKS-0637-752	ACS/WFC	1	12-Oct-2005 21:00:31.0	yes
02	(1) PKS-0637-752	NIC3	3	12-Oct-2005 21:00:36.0	yes
03	(1) PKS-0637-752	NIC3	3	12-Oct-2005 21:00:39.0	yes

7 Total Orbits Used

ABSTRACT

The matter content (electron-proton vs electron-positron composition) of extragalactic jets remains unknown, despite over three decades of work. Here, we propose NICMOS/NIC3 and ACS observations of the Chandra-detected, one sided jet of the superluminal quasar PKS 0637-752 to derive the jet matter content by measuring the component of the Cosmic Microwave Background (CMB) radiation that is bulk-Comptonized (BC) by the cold electrons in the relativistically flowing large scale jet. What makes this source particularly suited for this procedure, is the absence of significant

non-thermal jet emission from the 'bridge', the region between the core and the first bright knot WK7.8, guaranteeing that most of the electrons in the bridge are cold, leaving the BC scattered CMB radiation as the only significant source of photons in this region. The proposed NICMOS and ACS observations of the knot WK7.8 will provide spectral information in the IR-UV regime, which, together with existing multiwavelength data, will be used to derive the jet Doppler factor and minimum power necessary to power the knot emission as a function of the jet matter content. These will in turn be used to deduce, or strongly constrain, the actual jet matter content through comparison with the proposed NICMOS observations of the BC 'bridge' emission.

OBSERVING DESCRIPTION

We propose NICMOS and ACS observations of the single-sided jet
in quasar PKS 0637-752. For the NICMOS observations we have selected
NIC3, because its large pixel size makes is ideal for detecting extended low brightness sources, such as the BC emission from the bridge connecting the core and the first knot WK7.8 of PKS 0637-752.
More specifically, we propose a 7500s (3 orbit) observation of PKS 0637-752 with NIC3 using the F160W filter.
According to the NICMOS Exposure Time Calculator, this will yield a
S/N=3.00 for knot f_1.6 mu m=2.72 e-8 Jy.
Also, for the same configuration, an extended source will be detectable
at S/N=3.00 for f_1.6 mu m= 1.62e-7 Jy /arcsec^2.

We also propose a 2500s (1 orbit) observation of PKS 0637-752 with WFC of
ACS using the F475W filter. According to the ACS
Exposure Time Calculator, this will yield a S/N=3.01 for
f_4800 \AA=2.01e-8 Jy.
In both the NICMOS and ACS calculations we assumed a power law
spectrum F_nu ~nu^(-1), although the results did not change
significantly for a range of plausible spectral indexes.

These flux limits are sufficiently deep to guarantee the detection of the knots, and to ensure that the detection of or the deep flux limit imposed on the BC emission from the bridge will be sufficient to deduce or strongly constrain the jet matter content.
We will also perform a short (1 min) ACS observation to obtain the flux of the quasar core. This will help us subtract the PSF, which will be important in detecting any inner jet emission.

Visit

Proposal 10541, Visit 01 Thu Oct 13 01:00:41 GMT 2005

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: ORIENT 200.0D TO 250.0 D; ORIENT 110.0D TO 160.0 D; ORIENT 20.0D TO 70.0 D; ORIENT 290.0D TO 340.0 D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.145 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=47.2 Angle Between Sides= Center Pattern=false		(2)

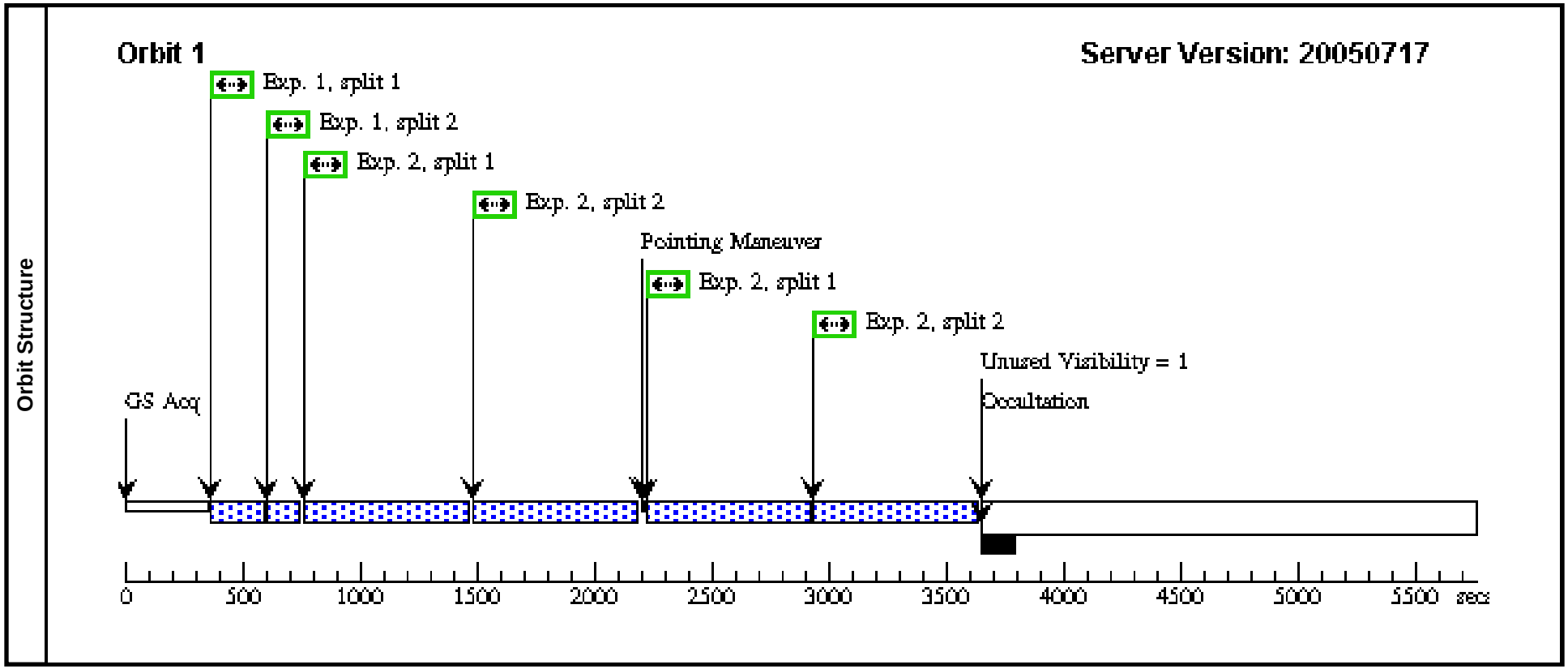
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	PKS-0637-752	RA: 06 35 46.5079 (98.9437829d) Dec: -75 16 16.82 (-75.27134d) Equinox: J2000 Plate Id: (?)		V=15.75	Coordinate Source: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) PKS-0637-752	ACS/WFC, ACCUM, WFC1-1K	F475W	CR-SPLIT=2			60.0 Secs	
								[==>50.0 Secs (Split 1)] *[==>50.0 Secs (Split 2)]*	***[1]***
2		(1) PKS-0637-752	ACS/WFC, ACCUM, WFC1-1K	F475W	CR-SPLIT=2		Pattern 2-2 (1)	600.0 Secs	
								[==>614.0 Secs (Pattern 1, Split 1)] *[==>614.0 Secs (Pattern 1, Split 2)]* *[==>614.0 Secs (Pattern 2, Split 1)]* *[==>614.0 Secs (Pattern 2, Split 2)]*	***[1]***


Orbit Structure
Orbit 1
Server Version: 20050717
Exp. 1, split 1
Exp. 1, split 2
Exp. 2, split 1
Exp. 2, split 2
Pointing Maneuver
Exp. 2, split 1
Exp. 2, split 2
Unused Visibility = 1
Occultation
GS Acq
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
sec

Visit

Proposal 10541, Visit 02 Thu Oct 13 01:00:42 GMT 2005

Diagnostic Status: No Diagnostics

Scientific Instruments: NIC3

Special Requirements: ORIENT 20.0D TO 70.0 D; ORIENT 110.0D TO 160.0 D; ORIENT 200.0D TO 250.0 D; ORIENT 290.0D TO 340.0 D

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=NIC-XSTRIP-DITH	Coordinate Frame=POS-TARG		(1)
	Purpose=DITHER	Pattern Orientation=0		
	Number Of Points=3	Angle Between Sides=		
	Point Spacing=1	Center Pattern=false		
	Line Spacing=			

Fixed Targets

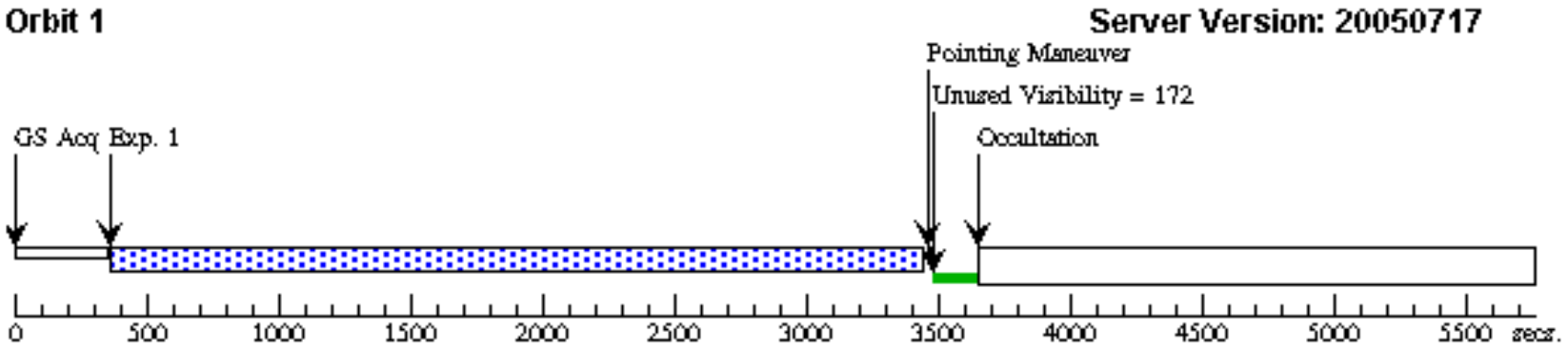
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	PKS-0637-752	RA: 06 35 46.5079 (98.9437829d) Dec: -75 16 16.82 (-75.27134d) Equinox: J2000 Plate Id: (?)		V=15.75	Coordinate Source: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

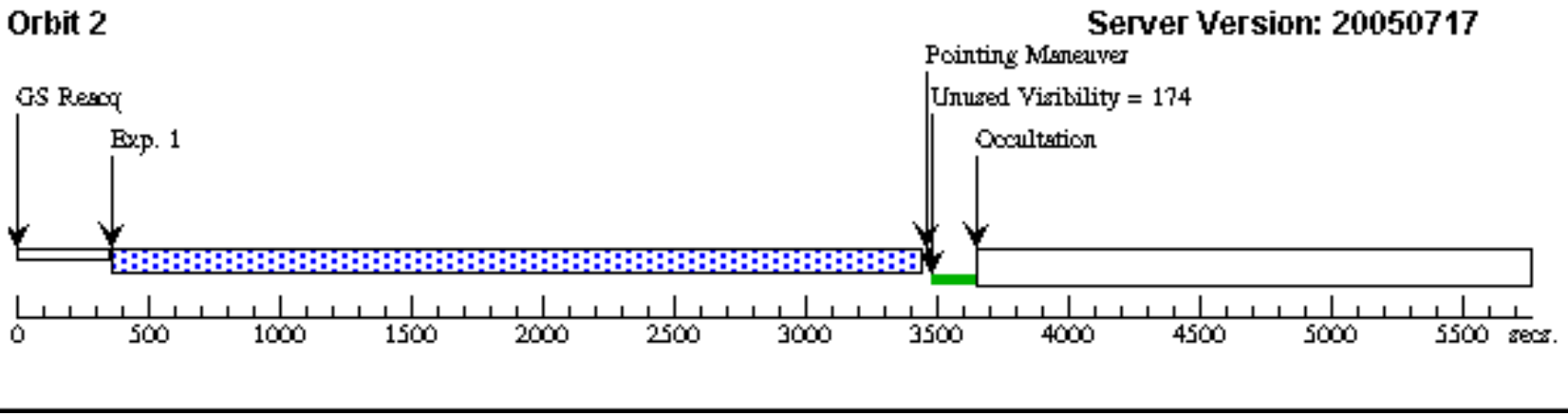
Exposures

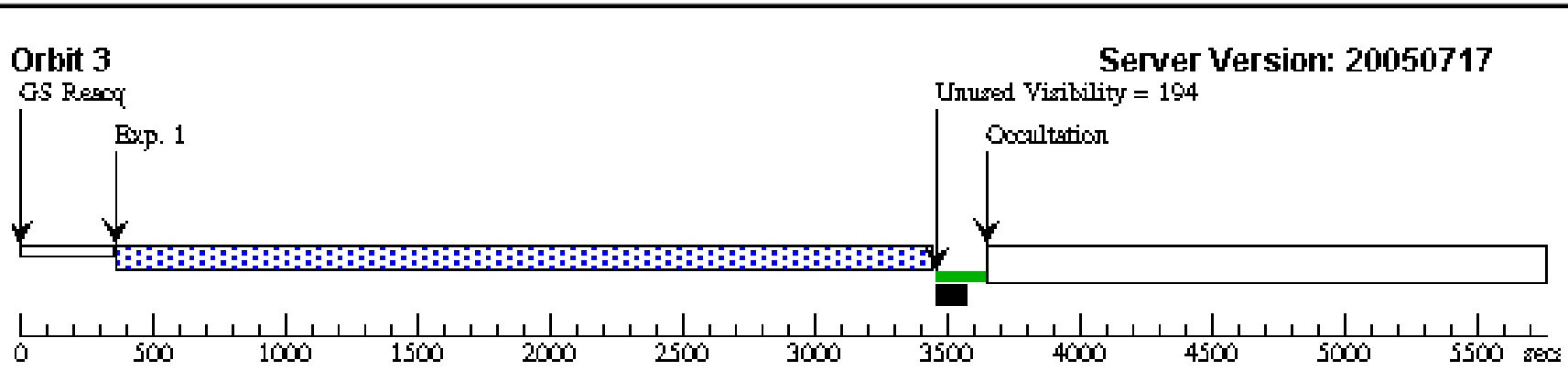
#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) PKS-0637-752	NIC3, MULTIACCUM, NIC3	F160W	NSAMP=22; SAMP-SEQ=STEP256	GS ACQ SCENARIO BASE1TNS	Pattern 1-1 (2)	*[==>(Pattern 1)]*	*[1]*
								[==>(Pattern 2)]	*[2]*
								[==>(Pattern 3)]	*[3]*

Orbit Structure



Orbit Structure (continued)





Visit

Proposal 10541, Visit 03 Thu Oct 13 01:00:42 GMT 2005

Diagnostic Status: No Diagnostics

Scientific Instruments: NIC3

Special Requirements: SAME ORIENT AS 02

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=NIC-XSTRIP-DITH	Coordinate Frame=POS-TARG		(1)
	Purpose=DITHER	Pattern Orientation=0		
	Number Of Points=3	Angle Between Sides=		
	Point Spacing=1	Center Pattern=false		
	Line Spacing=			

Fixed Targets

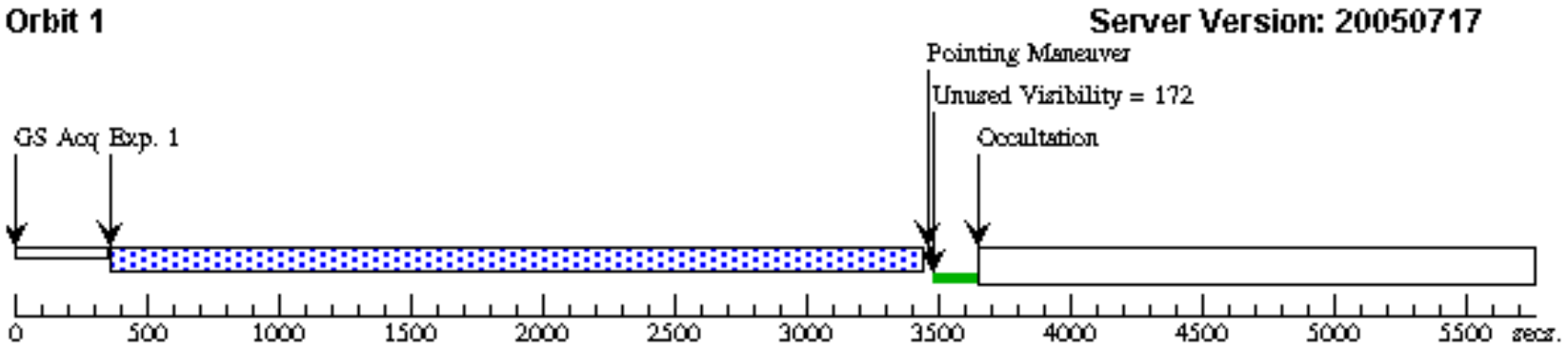
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	PKS-0637-752	RA: 06 35 46.5079 (98.9437829d) Dec: -75 16 16.82 (-75.27134d) Equinox: J2000 Plate Id: (?)		V=15.75	Coordinate Source: SIMBAD

Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1		(1) PKS-0637-752	NIC3, MULTIACCUM, NIC3	F160W	NSAMP=22; SAMP-SEQ=STEP256	GS ACQ SCENARIO BASE1TNS	Pattern 1-1 (2)	*[==>(Pattern 1)]*	*[1]*
								[==>(Pattern 2)]	*[2]*
								[==>(Pattern 3)]	*[3]*

Orbit Structure



Orbit Structure (continued)