17523 - Determining the broad line region continuum contribution in NGC 7469

Cycle: 31, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*
Dr. Edward M. Cackett (PI) (Contact)	**Wayne State University**
Dr. Aaron J. Barth (CoI)	University of California - Irvine
Dr. Michael R. Goad (CoI) (ESA Member)	University of Leicester
Prof. Kirk T. Korista (CoI)	Western Michigan University
Ethan Partington (CoI)	Wayne State University
Dr. Rick Edelson (CoI)	Eureka Scientific Inc.
Prof. Keith Horne (CoI) (ESA Member)	University of St. Andrews
Dr. Juan V. Hernandez Santisteban (CoI) (ESA Member)	University of St. Andrews

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) NGC-7469 CCDFLAT	STIS/CCD STIS/FUV-MAMA STIS/NUV-MAMA	2	17-Jun-2024 15:00:53.0	yes

2 Total Orbits Used

ABSTRACT

In the last decade, significant progress in understanding the sizescale and structure of the inner regions of Active Galactic Nuclei has been brought about by high cadence continuum reverberation mapping campaigns. Measuring time lags between light curves at different wavelengths probes sizescales not possible through imaging. Results from these campaigns are now seriously challenging the scenario where X-rays drive variability in a

standard optically thick, geometrically thin accretion disk at UV/optical wavelengths. Observational evidence suggests the presence of significant continuum emission from the broad line region (BLR). An 8-month multiwavelength continuum reverberation mapping campaign of the nearby bright Seyfert 1 NGC 7469 is on-going, utilizing NICER, Swift and ground-based monitoring. The UV and optical filter bands used for photometric monitoring include significant contamination by reprocessed emission from the broad-line region, including broad emission lines, Balmer continuum, and Fe II emission. To properly interpret the measured photometric lags therefore requires a careful assessment of the strength of each of these spectral components through the UV and optical. This can only be achieved with HST/STIS spectra covering from 1150 - 10000 Angstrom.

OBSERVING DESCRIPTION

Here we will obtain a simultaneous UV/optical spectrum of the AGN NGC 7469. These data are taken to support on-going multiwavelength monitoring of this source with NICER, Swift and ground-based data. That campaign is taking place from began in 2023 May 10 and will continue until 2024 Jan 12. As described in the Phase I proposal, we request that the HST observations take place before 2024 Jan 12. To maximize scheduling flexibility, we do not require any specific orientation or slit position angle. However, since this AGN is highly variable on timescales of days to weeks, it is critically important that the entire program be carried out in a single visit, so that we can obtain an accurate overall spectral shape for the AGN.

The scientific goal of these observations is to determine the contribution of broad emission lines, Balmer continuum and Fe II emission to the various broadband filters used in the Swift and ground-based photometric monitoring. To achieve this a contemporaneous broadband spectrum will be obtained with HST using STIS and the G140L, G230L, G430L and G750L gratings.

Two orbits have been approved in Phase I, and we will use the first orbit for target acquisition and the G140L exposures. The second orbit will be used for G230L, G430L and G750L. The AGN nucleus is very compact, and thus we will use the ACQTYPE=POINT for the STIS acquisition. We will use the 0.2 arcsec slit width for all spectroscopic exposures. For the CCD exposures, the E1 aperture position will be used to minimize CTE losses. With each grating, we will obtain dithered exposures using the STIS-ALONG-SLIT pattern to remove the effect of bad pixels and cosmic-ray hits in the CCD data and to maximize S/N in the MAMA data following Section 12.5.1 of the STIS Instrument Handbook.

We will use the STIS/MAMA in ACCUM mode to maximize the on source integration time, and since the variability timescales are such that we do not expect any detectable variability during a single exposure. The total CCD exposure is less than 30 minutes (including overheads) and thus it is allowable to have both STIS MAMA and CCD exposures in the same orbit. We will use GAIN=4 for the CCD

exposures to ensure that the peaks of the Halpha and [OIII] lines are well below the saturation level, based on STIS ETC calculations and a standard type I quasar spectrum.

For G750L we will obtain fringe flats at the end of the orbit. Following Table 11.1 of the STIS Instrument Handbook, the 52X0.1 slit will be used for the G750L fringe flats. We choose not to use the 52X0.2E2 aperture position for the G750L observation of the AGN because this will negatively impact the throughput and measurement of the spectral shape when combined with the other grating settings.

Proposal 17523 - Visit 01 - Determining the broad line region continuum contribution in NGC 7469

Visit

Proposal 17523, Visit 01, implementation Mon Jun 17 19:00:54 GMT 2024

Diagnostic Status: Warning

Scientific Instruments: STIS/NUV-MAMA, STIS/CCD, STIS/FUV-MAMA

Special Requirements: (none)

Diagnostics

(Visit 01) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 01) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

(Visit 01) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=STIS-ALONG-SLIT	Coordinate Frame=POS-TARG		(4), (5)
	Purpose=DITHER	Pattern Orientation=90.0		
	Number Of Points=4	Angle Between Sides=		
	Point Spacing=0.2	Center Pattern=false		
	Line Spacing=			
(3)	Pattern Type=STIS-ALONG-SLIT	Coordinate Frame=POS-TARG		(2), (3)
	Purpose=DITHER	Pattern Orientation=90.0		
	Number Of Points=3	Angle Between Sides=		
	Point Spacing=0.2	Center Pattern=false		
	Line Spacing=			

Fixed Targets

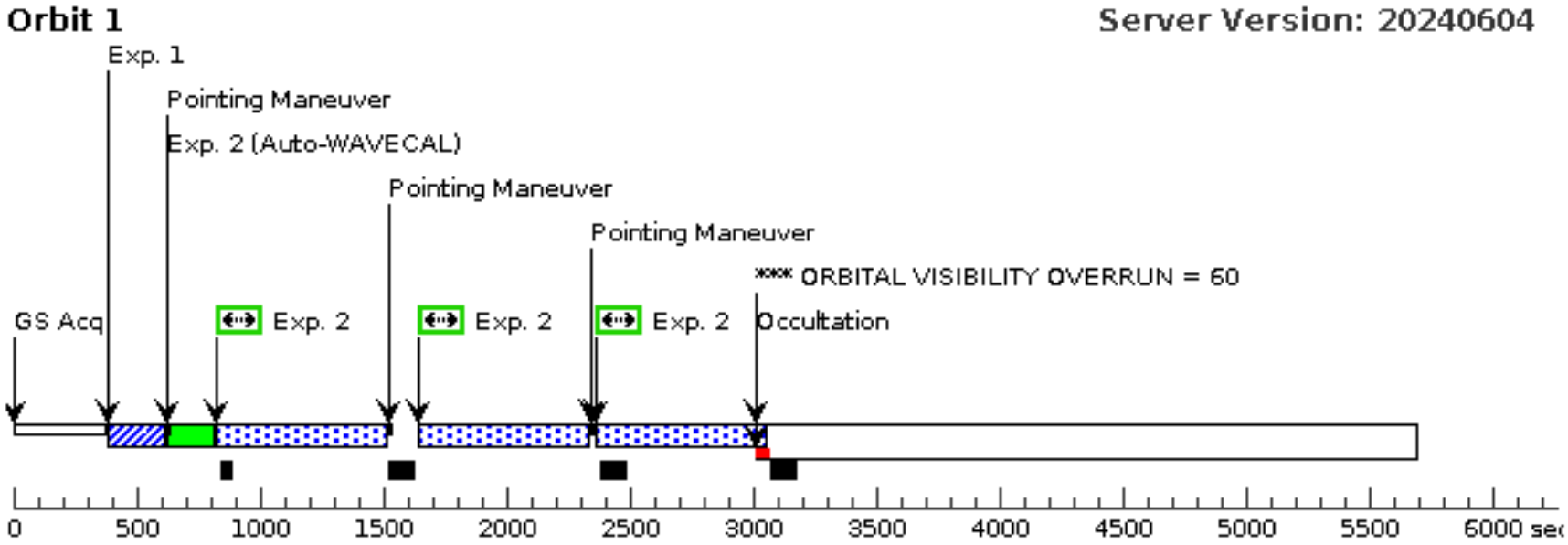
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC-7469	RA: 23 03 15.6740 (345.8153083d)	Epoch of Position: 2000	V=12.34	Reference Frame: ICRS
		Dec: +08 52 25.28 (8.87369d)	Redshift: 0.166	4E-14 erg/cm^2/s/A at 1500A from archival HST/FOS observations	
		Equinox: J2000			

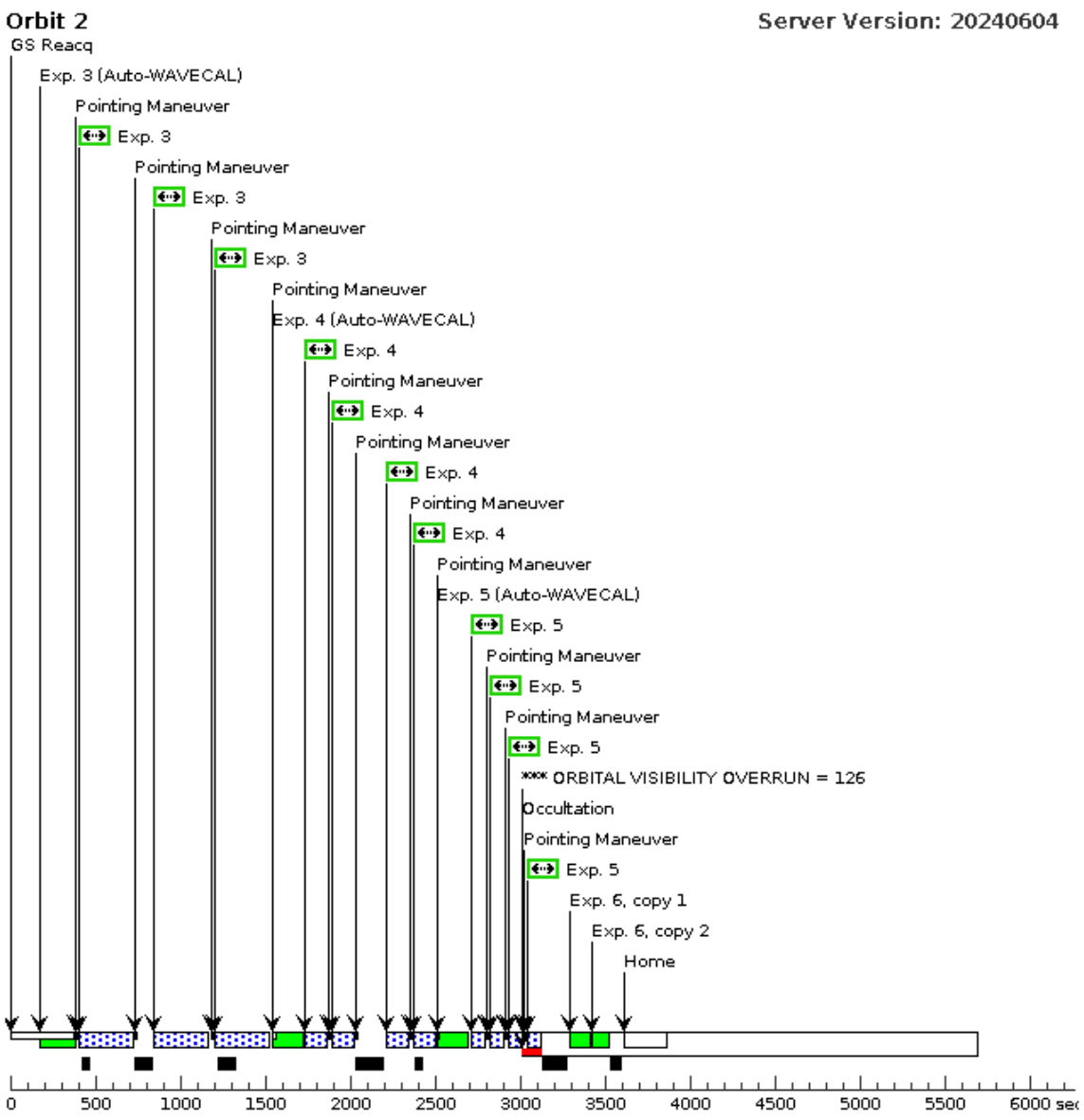
Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.
Category=GALAXY
Description=[ACCRETION DISK, BLR, SEYFERT]

Exposures

#	Label (ETC Run)	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) NGC-7469	STIS/CCD, ACQ, F28X50LP	MIRROR	ACQTYPE=POINT			1 Secs (1 Secs) *[==>]*	*[1]*
2	(STIS.sp.18 91593)	(1) NGC-7469	STIS/FUV-MAMA, ACCUM, 52X0.2	G140L 1425 A			Pattern 3, Exps 2-2 in Visit 01 (3)	676 Secs (2028 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	*[1]*
3	(STIS.sp.18 91588)	(1) NGC-7469	STIS/NUV-MAMA, ACCUM, 52X0.2	G230L 2376 A			Pattern 3, Exps 3-3 in Visit 01 (3)	307 Secs (924 Secs) *[==>308.0 Secs (Pattern 1)]* *[==>308.0 Secs (Pattern 2)]* *[==>308.0 Secs (Pattern 3)]*	*[2]*
4	(STIS.sp.18 91591)	(1) NGC-7469	STIS/CCD, ACCUM, 52X0.2E1	G430L 4300 A	CR-SPLIT=NO; GAIN=4		Pattern 2, Exps 4-4 in Visit 01 (2)	90 Secs (364 Secs) *[==>91.0 Secs (Pattern 1)]* *[==>91.0 Secs (Pattern 2)]* *[==>91.0 Secs (Pattern 3)]* *[==>91.0 Secs (Pattern 4)]*	*[2]*
5		(1) NGC-7469	STIS/CCD, ACCUM, 52X0.2E1	G750L 7751 A	CR-SPLIT=NO; GAIN=4		Pattern 2, Exps 5-5 in Visit 01 (2)	40 Secs (164 Secs) *[==>41.0 Secs (Pattern 1)]* *[==>41.0 Secs (Pattern 2)]* *[==>41.0 Secs (Pattern 3)]* *[==>41.0 Secs (Pattern 4)]*	*[2]*
6		CCDFLAT	STIS/CCD, ACCUM, 52X0.1	G750L 7751 A				*[==>(Copy 1)]* *[==>(Copy 2)]*	*[2]*

Orbit Structure




Orbit 2
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GS Reacq
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Exp. 3
Pointing Maneuver
Exp. 3
Pointing Maneuver
Exp. 3
Pointing Maneuver
Exp. 4 (Auto-WAVECAL)
Exp. 4
Pointing Maneuver
Exp. 4
Pointing Maneuver
Exp. 4
Pointing Maneuver
Exp. 4
Pointing Maneuver
Exp. 5 (Auto-WAVECAL)
Exp. 5
Pointing Maneuver
Exp. 5
Pointing Maneuver
Exp. 5
**** ORBITAL VISIBILITY OVERRUN = 126
Occultation
Pointing Maneuver
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Exp. 6, copy 2
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