16713 - The Hosts of Quasars with Newborn Jets Discovered in the Very Large Array Sky Survey

Cycle: 29, Proposal Category: GO

(Availability Mode: SUPPORTED)

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VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) J074248.40+270412.2	WFC3/IR	1	29-Jul-2021 11:01:53.0	yes
02	(2) J083247.64+230234.1	WFC3/IR	1	29-Jul-2021 11:01:54.0	yes
03	(3) J095036.75+512838.1	WFC3/IR	1	29-Jul-2021 11:01:55.0	yes
04	(4) J210916.85-064436.6	WFC3/IR	1	29-Jul-2021 11:01:56.0	yes

4 Total Orbits Used

ABSTRACT

We propose a WFC3/IR imaging study of the hosts of 4 quasars that were recently caught launching newborn jets by the Very Large Array Sky Survey (VLASS). The targets are broad-line (type 1) SDSS quasars at 0.2<z<1.0 that have transitioned from radio-quiet to radio-loud in the past 10-20 years. Extensive multi-wavelength follow-up observations in the radio and X-ray probing the jets and accretion states are underway, but the properties of the host galaxies remain unknown. The unmatched combination of angular resolution and PSF stability of HST is needed to enable accurate quasar/host galaxy decomposition and gain insights into the conditions under which quasar jets are born. Our proposed observations will measure the morphologies, sizes, and luminosities of the hosts of newborn quasar jets for the first time. A total of 4 orbits are required. Our sample size and observing request are modest, but will pave the way for larger studies in the next few years as new VLASS epochs continue to identify new candidates. We will compare the host properties of our sample with those of previous studies of quasar hosts. Our proposed study will help guide future campaigns with HST and JWST to determine the host galaxy properties and conditions under which jets are triggered.

OBSERVING DESCRIPTION

We will obtain new WFC3/IR images of the hosts of a quasars that were recently discovered to harbor newborn radio jets. The main goal is to search for signs of galaxy evolution drivers, such as major/minor mergers or tidal interactions, that may be associated with the triggering of the young jets.

Our WFC3/IR imaging strategy employs the use of a single broadband filter suitable for detecting the rest-frame optical emission from the main stellar population. We have carefully chosen the most appropriate WFC3/IR filter for each target to avoid strong lines with the potential for contamination by extended emission line regions. We expect the stellar light of the host galaxy to be bright relative to the (dominant) quasar in the filters we have selected. We will observe in MULTIACCUM mode using STEP spacing (STEP50) with a minimum of 11 samples (NSAMP >= 11).

We require a total of 4 orbits (one orbit per target) including all standard WFC3/IR overheads for guide star acquisition, dithering, and readouts. This will leave a total of ~2200 seconds per orbit for observing each target. We expect the underlying host galaxy brightness of each target in the selected WFC3/IR filter to be 21-22 (AB). Angular extents of the hosts are expected to be compact (0.2-2 arcseconds). Our adopted dithering strategy consists of a minimum of 5 exposures and is based on the wide patterns provided in the ISR WFC3 2016-14 (Supplemental Dither Patterns for WFC3/IR; Anderson 2016).

We have considered the ramifications of reduced-gyro operations on our program. We do not expect any major impediments to our science if another gyroscope failure occurs. However, in the event of such a failure, we will re-evaluate our observing plan based on the latest documentation by the WFC3 instrument team.

Visit

Proposal 16713, J0742 (01) Thu Jul 29 15:01:57 GMT 2021

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: (none)

Fixed Targets

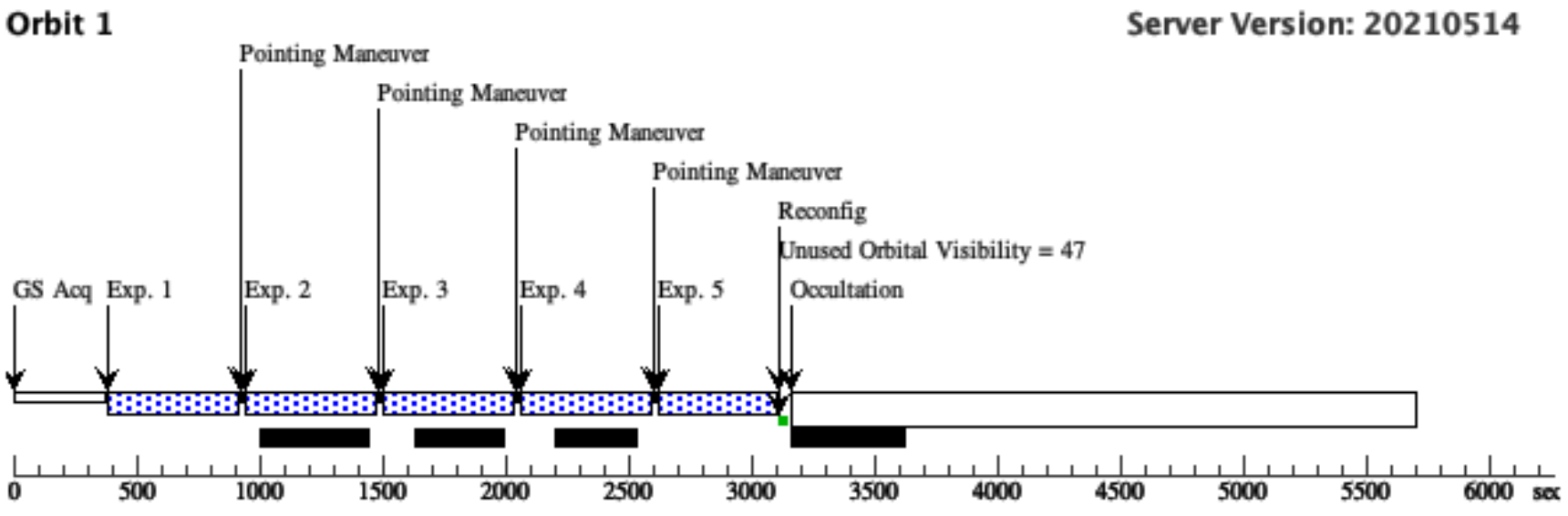
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	J074248.40+270412.2	RA: 07 42 48.4310 (115.7017958d) Dec: +27 04 12.41 (27.07011d) Equinox: J2000	Redshift: 0.6264	V=19.4	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[QUASAR]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) J074248.40+270412.2	WFC3/IR, MULTIACCUM, IR	F140W	NSAMP=15; SAMP-SEQ=STEP50	POS TARG 0,0		499.234285 Secs (499.234 Secs) *[==>]*	*[1]*
2		(1) J074248.40+270412.2	WFC3/IR, MULTIACCUM, IR	F140W	NSAMP=15; SAMP-SEQ=STEP50	POS TARG 0.704,0.051		499.234285 Secs (499.234 Secs) *[==>]*	*[1]*
3		(1) J074248.40+270412.2	WFC3/IR, MULTIACCUM, IR	F140W	NSAMP=15; SAMP-SEQ=STEP50	POS TARG 1.409,0.101		499.234285 Secs (499.234 Secs) *[==>]*	*[1]*
4		(1) J074248.40+270412.2	WFC3/IR, MULTIACCUM, IR	F140W	NSAMP=15; SAMP-SEQ=STEP50	POS TARG 0.352,0.630		499.234285 Secs (499.234 Secs) *[==>]*	*[1]*
5		(1) J074248.40+270412.2	WFC3/IR, MULTIACCUM, IR	F140W	NSAMP=14; SAMP-SEQ=STEP50	POS TARG 1.057,0.681		449.233834 Secs (449.234 Secs) *[==>]*	*[1]*

Orbit Structure



Visit

Proposal 16713, J0832 (02)

Thu Jul 29 15:01:57 GMT 2021

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: (none)

Fixed Targets

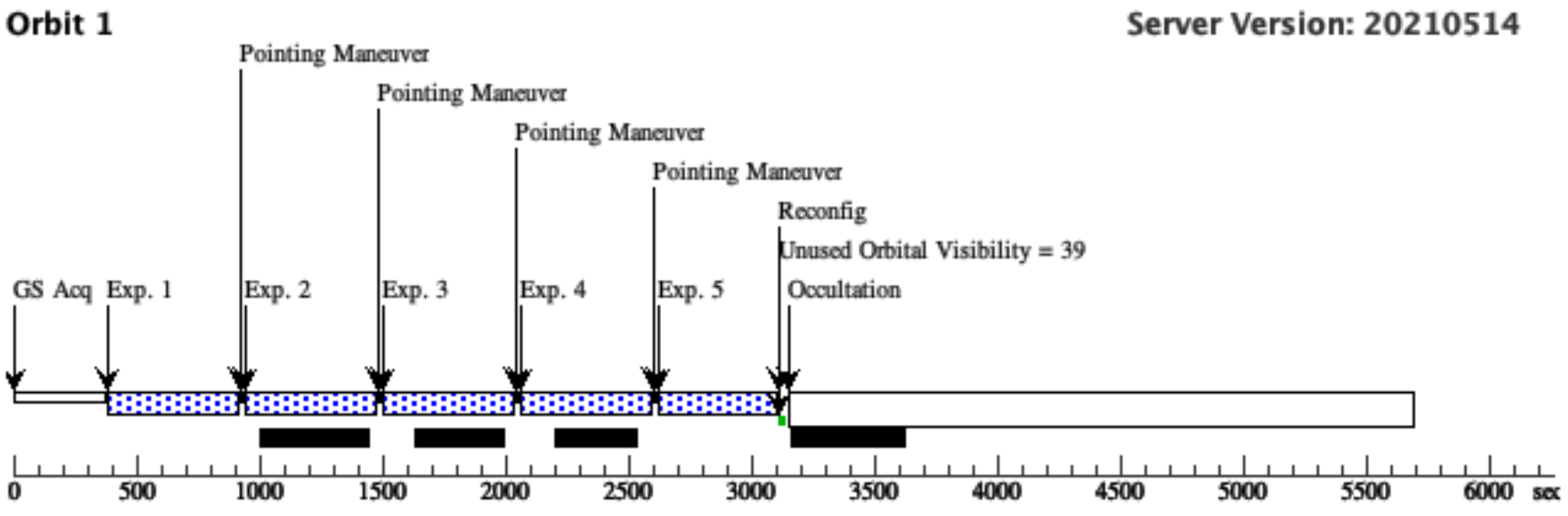
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	J083247.64+230234.1	RA: 08 32 47.6431 (128.1985129d) Dec: +23 02 34.14 (23.04282d) Equinox: J2000	Redshift: 0.943	V=20.0	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[QUASAR]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(2) J083247.64+230234.1	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=15; SAMP-SEQ=STEP50	POS TARG 0,0		499.234285 Secs (499.234 Secs) *[==>]*	*[1]*
2		(2) J083247.64+230234.1	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=15; SAMP-SEQ=STEP50	POS TARG 0.704,0.051		499.234285 Secs (499.234 Secs) *[==>]*	*[1]*
3		(2) J083247.64+230234.1	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=15; SAMP-SEQ=STEP50	POS TARG 1.409,0.101		499.234285 Secs (499.234 Secs) *[==>]*	*[1]*
4		(2) J083247.64+230234.1	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=15; SAMP-SEQ=STEP50	POS TARG 0.352,0.630		499.234285 Secs (499.234 Secs) *[==>]*	*[1]*
5		(2) J083247.64+230234.1	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=14; SAMP-SEQ=STEP50	POS TARG 1.057,0.681		449.233834 Secs (449.234 Secs) *[==>]*	*[1]*

Orbit Structure



Visit

Proposal 16713, J0950 (03) Thu Jul 29 15:01:57 GMT 2021

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: (none)

Fixed Targets

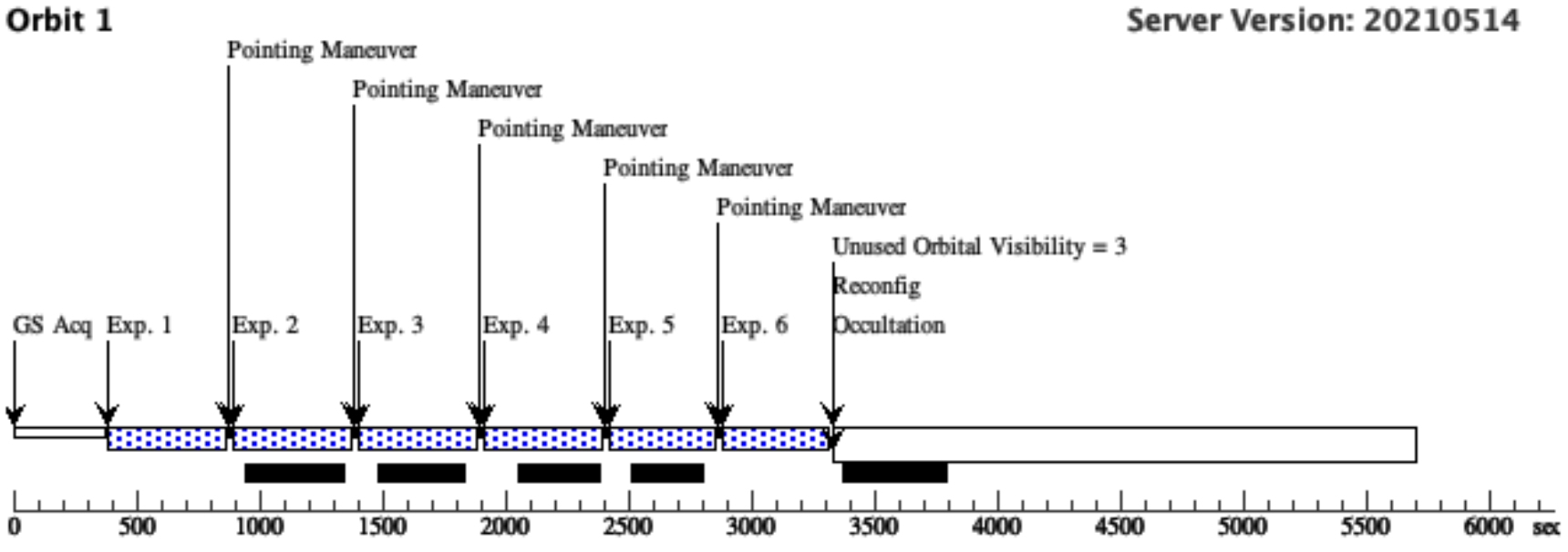
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	J095036.75+512838.1	RA: 09 50 36.7615 (147.6531729d) Dec: +51 28 37.96 (51.47721d) Equinox: J2000	Redshift: 0.2142	V=17.7	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[QUASAR]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(3) J095036.75+512838.1	WFC3/IR, MULTIACCUM, IR	F110W	NSAMP=14; SAMP-SEQ=STEP50	POS TARG 0,0		449.233834 Secs (449.234 Secs) *[==>]*	*[1]*
2		(3) J095036.75+512838.1	WFC3/IR, MULTIACCUM, IR	F110W	NSAMP=14; SAMP-SEQ=STEP50	POS TARG 0.700,0.063		449.233834 Secs (449.234 Secs) *[==>]*	*[1]*
3		(3) J095036.75+512838.1	WFC3/IR, MULTIACCUM, IR	F110W	NSAMP=14; SAMP-SEQ=STEP50	POS TARG 1.399,0.025		449.233834 Secs (449.234 Secs) *[==>]*	*[1]*
4		(3) J095036.75+512838.1	WFC3/IR, MULTIACCUM, IR	F110W	NSAMP=14; SAMP-SEQ=STEP50	POS TARG 0.068,0.706		449.233834 Secs (449.234 Secs) *[==>]*	*[1]*
5		(3) J095036.75+512838.1	WFC3/IR, MULTIACCUM, IR	F110W	NSAMP=13; SAMP-SEQ=STEP50	POS TARG 0.768,0.648		399.233383 Secs (399.233 Secs) *[==>]*	*[1]*
6		(3) J095036.75+512838.1	WFC3/IR, MULTIACCUM, IR	F110W	NSAMP=13; SAMP-SEQ=STEP50	POS TARG 1.468,0.690		399.233383 Secs (399.233 Secs) *[==>]*	*[1]*

Orbit Structure



Visit

Proposal 16713, J2109 (04)

Thu Jul 29 15:01:57 GMT 2021

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: (none)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(4)	J210916.85-064436.6	RA: 21 09 16.8634 (317.3202642d) Dec: -06 44 36.46 (-6.74346d) Equinox: J2000	Redshift: 1.0812	V=18.6	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[QUASAR]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(4) J210916.85-064436.6	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=15; SAMP-SEQ=STEP50	POS TARG 0,0		499.234285 Secs (499.234 Secs) *[==>]*	*[1]*
2		(4) J210916.85-064436.6	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=15; SAMP-SEQ=STEP50	POS TARG 0.704,0.051		499.234285 Secs (499.234 Secs) *[==>]*	*[1]*
3		(4) J210916.85-064436.6	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=15; SAMP-SEQ=STEP50	POS TARG 1.409,0.101		499.234285 Secs (499.234 Secs) *[==>]*	*[1]*
4		(4) J210916.85-064436.6	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=15; SAMP-SEQ=STEP50	POS TARG 0.352,0.630		499.234285 Secs (499.234 Secs) *[==>]*	*[1]*
5		(4) J210916.85-064436.6	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=14; SAMP-SEQ=STEP50	POS TARG 1.057,0.681		449.233834 Secs (449.234 Secs) *[==>]*	*[1]*

Orbit Structure