16485 - Hidden Binary Supermassive Black Holes Revealed by 'Radio-Near IR' Imaging

Cycle: 28, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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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) J094822.45+684835.2	WFC3/IR	1	02-Feb-2021 16:01:59.0	yes
02	(2) J122313.21+540906.5	WFC3/IR	1	02-Feb-2021 16:02:00.0	yes

2 Total Orbits Used

ABSTRACT

Nearly all galaxies harbor supermassive black holes and galaxy mergers are common in hierarchical galaxy formation. Therefore, the study of dual (~1kpc separation) or binary (~1pc separation) supermassive black hole (SMBH) is very important to understand the co-evolution of SMBH and its host galaxy. However, the number of confirmed dual or binary AGNs is small because most of the follow-up observations of the dual or binary SMBH candidates rely on a single observing band and therefore have a low success rate when one of the two (or both) AGNs is not visible in the chosen band. Based on the recent discovery of the radio-optical dual AGN demonstrating the importance of the multiband confirmation, we propose a pilot study of dual/binary AGN search using both highresolution radio and NIR images from VLBA and HST in order not to miss AGN that is visible only in either one of the observing bands. This program will provide high-resolution radio and NIR images to measure the separation of the two AGNs with the estimate of the galaxy stellar mass and black hole mass, and will demonstrate the power of using VLBA and HST(JWST in future) for a large scale systematic search for binary SMBHs.

OBSERVING DESCRIPTION

We propose using HST/WFC3 F160W (H band). The 2MASS H band integrated magnitude for the targets are 14.49 and 14.14 mag. We find the optimal exposure sequence that has a mixture of short and long exposure to avoid a saturation at the center of galaxies and obtain a reliable nuclear morphology, while we sample the host galaxy morphology beyond half-light radius with surface brightness of 21.5 mag/arcsec^2 in F160W, using exposure time calculator. We will use the standard 4-point dithering for each visit and find that 1 orbit for each target will be sufficient for on source exposure with 2 repeats of the dither pattern.

Visit

Proposal 16485, Visit 01 Tue Feb 02 21:02:01 GMT 2021

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false		(1)

Fixed Targets

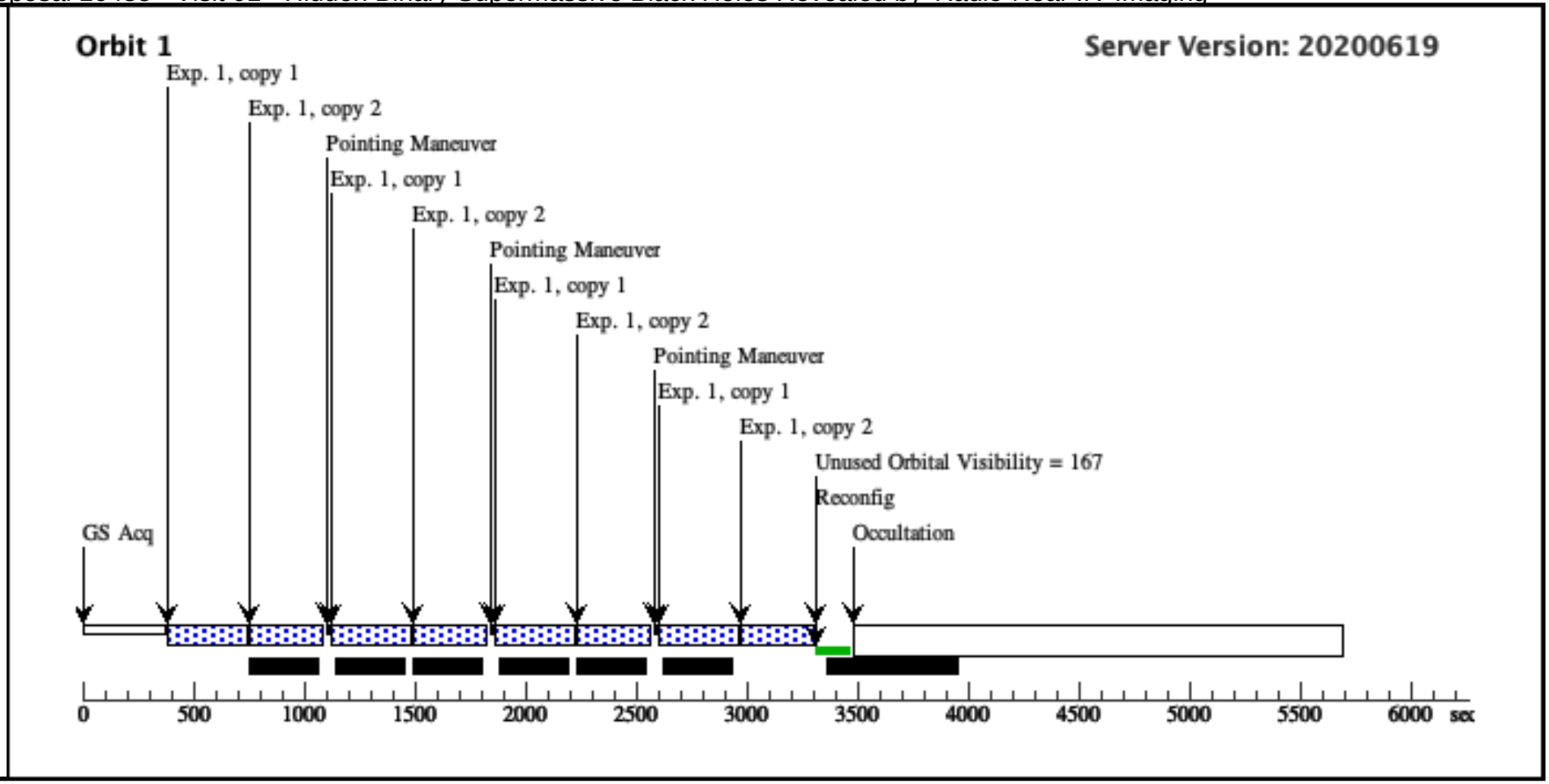
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	J094822.45+684835.2	RA: 09 48 22.4592 (147.0935800d) Dec: +68 48 35.23 (68.80979d) Equinox: J2000	Epoch of Position: 2000 Redshift: 0.201	V=18.82	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[MULTIPLE NUCLEI]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) J094822.45+684835.2	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=14; SAMP-SEQ=SPARS25		Pattern 1, Exps 1-1 in Visit 01 (1)	327.938986 Secs X 2 (2623.512 Secs)	
								[==>(Pattern 1, Copy 1)] *[==>(Pattern 1, Copy 2)]* *[==>(Pattern 2, Copy 1)]* *[==>(Pattern 2, Copy 2)]* *[==>(Pattern 3, Copy 1)]* *[==>(Pattern 3, Copy 2)]* *[==>(Pattern 4, Copy 1)]* *[==>(Pattern 4, Copy 2)]*	***[1]***

Orbit Structure



Visit

Proposal 16485, Visit 02 Tue Feb 02 21:02:01 GMT 2021

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false		(1)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	J122313.21+540906.5	RA: 12 23 13.2147 (185.8050612d) Dec: +54 09 6.46 (54.15179d) Equinox: J2000	Epoch of Position: 2000 Redshift: 0.155	V=17.35	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[MULTIPLE NUCLEI]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(2) J122313.21+540906.5	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=14; SAMP-SEQ=SPARS25		Pattern 1, Exps 1-1 in Visit 02 (1)	327.938986 Secs X 2 (2623.512 Secs)	
								[==>(Pattern 1, Copy 1)] *[==>(Pattern 1, Copy 2)]* *[==>(Pattern 2, Copy 1)]* *[==>(Pattern 2, Copy 2)]* *[==>(Pattern 3, Copy 1)]* *[==>(Pattern 3, Copy 2)]* *[==>(Pattern 4, Copy 1)]* *[==>(Pattern 4, Copy 2)]*	***[1]***

Orbit Structure