16460 - Confirming a Gravitationally Lensed Quasar Candidate at z=5.07

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) SDSS-J002526.83-014532.5	ACS/WFC	2	30-Nov-2020 13:00:13.0	yes

2 Total Orbits Used

ABSTRACT

Although a high fraction of quasars is predicted to be gravitationally lensed at high redshift, only one z>5 lensed quasar has been discovered to date (J0439+1634 at z=6.5). Recently we identified a promising candidate of a lensed quasar at z=5.07, J0025-0145, which would be the second lensed quasar at z>5 if confirmed. A number of observational evidences strongly suggest J0025-0145 being lensed, including (1) the existence of a foreground lens galaxy, (2) the ground-based image is extended and is well-fitted by a lensing model, and (3) the SMBH mass implies an exceptionally high super-Eddington accretion ratio, which can be explained by lensing magnification. The characteristics of J0025-0145 strongly resemble those of J0439+1634. Our model suggests that J0025-0145 is a compact lens (image separation ~0.1") with large magnification (~80). HST is needed to confirm the lensing scenario. Because of its high magnification, J0025-0145 will provide the first chance to study the host galaxy of a faint quasar at z>5 with high S/N and high spatial resolution, and to probe the SMBH/galaxy co-evolution in a low mass system at high-redshift in

great details. We propose ACS/WFC imaging of J0025-0145. We will use F435W to capture the lens galaxy, and use F606W to measure the lensed quasar images. The proposed observation will be the definitive test of the lensing hypothesis, and will provide an accurate lensing model which will enable follow-up studies, especially high S/N JWST and ALMA observations. The proposed observation will be a crucial step towards building a sample of high-redshift lensed quasars, which is essential to a comprehensive view of high-redshift SMBH population.

OBSERVING DESCRIPTION

This program will perform high-resolution ACS/WFC imaging of a gravitationally lensed quasar candidate at z=5.07. We will take the images with two filters: F435W which captures the deflector galaxy, and F606W which captures the lensed quasar images.

The program has been awarded for two orbits and we will finish the observation with one visit. The first orbit will obtain four F606W images, and the second orbit will obtain four F435W images. We will do dithering to improve the image sampling.

Visit

Proposal 16460, Visit 01 Mon Nov 30 18:00:14 GMT 2020

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.262 Line Spacing=0.192	Coordinate Frame=POS-TARG Pattern Orientation=18.39 Angle Between Sides=68.14 Center Pattern=false		(1), (2)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	SDSS-J002526.83-014532.5	RA: 00 25 26.8300 (6.3617917d) Dec: -01 45 32.50 (-1.75903d) Equinox: J2000		V=(?) SDSS g=22.82, SDSS r=19.57	Reference Frame: ICRS

Comments: Coordinates and magnitudes from SDSS
Category=GALAXY
Description=[QSO, QUASAR]
Extended=NO

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) SDSS-J002526.83-014532.5	ACS/WFC, ACCUM, WFC1-CTE	F606W			Pattern 1, Exps 1-1 in Visit 01 (1)	400 Secs (2064 Secs)	
								[==>516.0 Secs (Pattern 1)]	***[1]***
								[==>516.0 Secs (Pattern 2)]	
								[==>516.0 Secs (Pattern 3)]	
								[==>516.0 Secs (Pattern 4)]	
2		(1) SDSS-J002526.83-014532.5	ACS/WFC, ACCUM, WFC1-CTE	F435W			Pattern 1, Exps 2-2 in Visit 01 (1)	400 Secs (2072 Secs)	
								[==>518.0 Secs (Pattern 1)]	***[2]***
								[==>518.0 Secs (Pattern 2)]	
								[==>518.0 Secs (Pattern 3)]	
								[==>518.0 Secs (Pattern 4)]	

Orbit Structure