15950 - 2MASS J13260399+7023462: One of the Most Luminous Quasars in the Universe?

Cycle: 27, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
Prof. Anthony Hernan Gonzalez (PI) (Contact)	**University of Florida**	**anthonyhg@ufl.edu**
Mr. Sarik Jeram (CoI)	University of Florida	sarik93@ufl.edu
Prof. Stephen S. Eikenberry (CoI)	University of Florida	eiken@astro.ufl.edu

VISITS

Visit	*Targets used in Visit*	*Configurations used in Visit*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) 2MASSJ13260399+7023462	WFC3/IR WFC3/UVIS	1	29-Aug-2019 19:00:22.0	yes

1 Total Orbits Used

ABSTRACT

We request a single orbit of WFC3 imaging to discern whether the recently discovered quasar 2MASS J13260399+7023462 (z=2.88) is one of the most ultraluminous quasars in the Universe, or is instead a strongly-lensed system that is unresolved in ground-based and Gaia imaging. If the quasar remains unresolved at HST/WFC3 resolution, this will exclude lensing for plausible foreground lens masses. If it is resolved, then these observations will enable us to model the lens system and constrain the magnification. This quasar is physically interesting in either scenario -- for probing the bright tail of the QSO luminosity function if unlensed, or else for enabling future lensing-based programs, such as probing the foreground IGM on small scales.

OBSERVING DESCRIPTION

Given the brightness of this quasar, the primary concern is not attaining sufficient SNR, but rather avoiding saturation of the detector. We also desire multi-band photometry to enable clean separation of the QSO and the foreground lens (if there is one), and sufficient depth in the reddest band to detect a foreground lens down to 0.1 L*.

We first select the F475W filter (which includes Ly-alpha for this source) and the F160W filter to the broadest possible wavelength coverage. In setting the exposure times, we thus have two criteria. First, we require that individual exposures will not be saturated even if the source is unlensed. This requirement limits us to exposure times shorter than 1 min for the WFC/UVIS F475W filter and <20 s for the WFC3/IR F160W filter. Because of the short exposures, we opt for us of a 512 x 512 sub-array with WFC3/UVIS to increase the efficiency of the program. For F475W, we are using the WFC3-UVIS-LINE-3PT dither pattern with 2x45s exposures at each dither position. This yields a total exposure time of 270s, which provides very high SNR for the QSO but reaches only ~L* for a lens at z = 1 with a passively evolving stellar population. Because of the short exposures and corresponding low background (estimated at 1e'/pixel) we have included FLASH=11 in the options to reach a 12e'/pixel background and mitigate CTE. **Note that we intentionally did not use AUTO-ADJUST in the orbit planning, as this extends the F475W exposures to 55s, which is uncomfortably close to the saturation limit.

For the F160W we are using a 4 point dither patter in combination with the SAMP-SEQ=STEP100 and NSAMP=8, for a total exposure time of 796s. The purpose of the F160W imaging is two-fold: (1) to help deblend the QSO and foreground lens, and (2) to identify any galaxy overdensity in the field that may be associated with a protocluster at the redshift of the quasar. The quasar will be saturated beyond NSAMP=4, so the total usable time for the QSO will be 44s (which is sufficient). The total 796s will enable us to reach to <0.1 L* for a z=1 lens at SNR>10.

The above imaging, including the associated overheads, fits well within a single orbit. With the remaining fraction of an orbit we therefore add one additional filter, F105W. This remaining time is sufficient for a 1197s F105W observation to match the F160W imaging in reaching < 0.1 L* for a z = 1 lens at SNR= 10. This filter gives additional leverage in deblending a foreground lens, and also for identifying any galaxy overdensity in the field that may be associated with a proto-cluster at the redshift of the quasar. As with F160W we use a 4 point dither pattern with SAMP-SEQ=STEP100, but in this instance set NSAMP=9.

Reduced-gryo operations should have no impact on this program.

Visit

Proposal 15950, Visit 01, implementation Thu Aug 29 23:00:23 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR, WFC3/UVIS

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-DITHER-LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.135 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false		(1)
(2)	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		(2), (3)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	2MASSJ13260399+7023462	RA: 13 26 3.9952 (201.5166467d) Dec: +70 23 46.31 (70.39620d) Equinox: J2000	Proper Motion RA: 0 Proper Motion Dec: 0 Parallax: 0" Epoch of Position: 2015.5	V=16.4+/-0.1	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[QSO]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) 2MASSJ13260399+7023462	WFC3/UVIS, ACCUM, UVIS2-C512C-SUB	F475W	FLASH=11	GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-1 in Visit 01 (1)	45 Secs X 2 (270 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)]*	***[1]***
2		(1) 2MASSJ13260399+7023462	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=9; SAMP-SEQ=STEP100		Pattern 2, Exps 2-2 in Visit 01 (2)	299.231323 Secs (1196.925 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
3		(1) 2MASSJ13260399+7023462	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=8; SAMP-SEQ=STEP100		Pattern 2, Exps 3-3 in Visit 01 (2)	199.231 Secs (796.924 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***

Orbit Structure