15697 - Photometric Confirmation of the Brightest Known Galaxy Candidate at z > 9

Cycle: 26, 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) COSMOS-Z910-14822	WFC3/IR	2	18-Apr-2019 12:00:27.0	yes

2 Total Orbits Used

ABSTRACT

We request two orbits of WFC3 imaging with the F098M filter to confirm the Lyman break and constrain the redshift of a remarkably bright H=24.5 galaxy in the CANDELS COSMOS field. Photometric redshift analyses including previous HST (V, I, J and H-band) and ground-based imaging overwhelmingly prefer a redshift of z ~ 9.5. A galaxy this luminous (in the searched volume) so early in the universe sets tight constraints on the onset of star formation and AGN growth, thus even this single source would be a game changer (regardless of its ionizing source).

However, the inclusion of Spitzer/IRAC photometry complicates the picture. Two different deblending methods both successfully subtract bright neighboring galaxies, measuring significant flux at the position of this exceptional source at both 3.6 and 4.5 um. However, the [3.6]-[4.5] color is slightly different between these two methods, with one method measuring a slightly red color, consistent with z~9.5, and the other measuring a slightly blue color, preferring z~2. This systematic uncertainty in the deblending process prevents a concrete determination of the nature of this source.

An efficient two orbits of F098M imaging will break this redshift degeneracy. At this depth, if the galaxy is truly at z~2 we will detect it at 5-sigma significance, while a non-detection will rule out all low-redshift solutions, regardless of the IRAC photometry used, at >99.5% confidence. These observations are urgent, as once the nature of this source is known, deep spectroscopy can be pursued to measure the precise redshift, allowing detailed investigations with JWST Cycle 1 spectroscopy.

OBSERVING DESCRIPTION

We are observing one source of interest in the F098M filter. We have selected a center position ~40" away from the source, and allowable PAs, to try to exclude a nearby bright star from the image. This submitted APT has one observing window in May-June. We have worked with the contact scientist to create a separate APT for an ORIENT (300) which is observable at the end of the year, should this proposal not be scheduled earlier.

We have designed a set of four exposures per orbit, using the "DITHER-BLOB" dither pattern, with a larger dither of two points (one per orbit), with four sub-dithers per orbit. We selected exposures with SPARS25 and NSAMP=13, based on recommendations of previous users, and to allow exposure times to fill our orbits. We have verified a wide schedulability window for our program.

I note that we have centered our pointing on the target called "COSMOS-Z910-14822". Our actual target is known by "COSMOS-SOURCE", which we used to ensure it would fall on the detector across the allowable ORIENT range in Aladin.

Visit

Proposal 15697, 1 (01), implementation Thu Apr 18 16:00:28 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: ORIENT 102D TO 146 D

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(1)	Pattern Type=WFC3-IR-DITHER-BLOB Purpose=DITHER Number Of Points=2 Point Spacing=5.183 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=41.859 Angle Between Sides= Center Pattern=true	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	(1-2)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	COSMOS-Z910-14822	RA: 10 00 36.2069 (150.1508621d) Dec: +02 13 32.61 (2.22573d) Equinox: J2000		V=24.5+/-0.05	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[HIGH REDSHIFT GALAXY]
Extended=NO

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) COSMOS-Z910-14822	WFC3/IR, MULTIACCUM, IR	F098M	SAMP-SEQ=SPARS25; NSAMP=13		Pattern 1, Exps 1-2 in 1 (01) (1)	302.938471 Secs (2423.508 Secs)	
								[==>(Pattern 1,1)] *[==>(Pattern 1,2)]* *[==>(Pattern 1,3)]* *[==>(Pattern 1,4)]*	***[1]***
								[==>(Pattern 2,1)] *[==>(Pattern 2,2)]* *[==>(Pattern 2,3)]* *[==>(Pattern 2,4)]*	***[2]***
2		(1) COSMOS-Z910-14822	WFC3/IR, MULTIACCUM, IR	F098M	SAMP-SEQ=SPARS25; NSAMP=13		Pattern 1, Exps 1-2 in 1 (01) (1)	302.938471 Secs (2423.508 Secs)	
								[==>(Pattern 1,1)] *[==>(Pattern 1,2)]* *[==>(Pattern 1,3)]* *[==>(Pattern 1,4)]*	***[1]***
								[==>(Pattern 2,1)] *[==>(Pattern 2,2)]* *[==>(Pattern 2,3)]* *[==>(Pattern 2,4)]*	***[2]***

Orbit Structure