14701 - Is galaxy formation different during the epoch of reionization? Confirmation of the brightest ever candidate at redshift z>8

Cycle: 24, 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) BORG0116+1425	WFC3/IR	1	29-Jul-2016 14:55:36.0	yes

1 Total Orbits Used

ABSTRACT

How bright can galaxies be during the epoch of reionization? Recent Hubble observations challenged prior expectations and led to the identification of two surprisingly luminous galaxies with spectroscopic confirmation within 600 Myr from the Big Bang: A source with m_AB=25.3 at z=8.7 and another with m_AB=26.0 at z=11.1. Such galaxies hint a tension with the assumption of a luminosity function (LF) with a Schechter (exponential) profile at the bright end, otherwise well established after reionization is complete. A clear excess of L>L* galaxies, if confirmed, would be a strong indication of a different physics of galaxy formation at play during the epoch of reionization. Leveraging upon the large-area pure-parallel BoRG survey, we identified a yet more luminous galaxy candidate at z>8, a source with m_AB=24.5, corresponding to M_AB=-22.8, almost ten times brighter than the Milky Way! The F105W dropout is detected at very high S/N in the IR, has no optical flux and a compact size (r_e=0."17) leading

to a most likely redshift of z~8.4. However, a secondary peak in the redshift distribution is present at z~1.8 (p~10%). To exclude this solution and confirm the high-z nature of BoRG_0116+1425, we propose observations in the medium-band F098M filter. If the galaxy is an interloper, it will have m_AB~26.4 in F098M, while it will be undetected if at z>7.8. Since a Schechter-like LF predicts less than 0.002 galaxies as bright as BoRG_0116+1425 in the survey area, this single orbit proposal has the potential to unequivocally establish departure from a Schechter LF at confidence greater than 99.8%, supporting theoretical predictions of decreasing efficiency of AGN feedback at high-z

OBSERVING DESCRIPTION

The observation consists of one 1-orbit visit of F098M imaging (4 exposures).

We selected 4 13-NSAMP SPARS50 exposures to fill the orbit, using a 4-point minimum box with optimal half-pixel sampling in both x and y.

Timing requirements are requested to coordinate ground-based follow-up observations of targets selected by these HST observations using the MOSFIRE spectrograph on Keck.

Visit

Proposal 14701, Visit 01 Fri Jul 29 18:55:37 GMT 2016

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: ORIENT 63D TO 70 D; ORIENT 152D TO 165 D; ORIENT 234D TO 262 D; BEFORE 25-FEB-2017:00:00:00

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)	BORG0116+1425	RA: 01 16 12.2566 (19.0510692d) Dec: +14 24 38.77 (14.41077d) Equinox: J2000		V=(?) 24.5 in F160W	Reference Frame: ICRS

Comments: Dropout coordinates are: 01 16 8.3280 +14 24 9.36
Field of view has been centered to increase overlap with original BoRG field

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) BORG0116+1425	WFC3/IR, MULTIACCUM, IR	F098M	NSAMP=14; SAMP-SEQ=SPARS50		Pattern 1, Exps 1-1 in Visit 01 (1)	652.938154 Secs (2611.753 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	*[1]*

Orbit Structure