14459 - Preparing for JWST through Constraints on the Bright End of the z~9 LF from CANDELS

Cycle: 23, 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-Z9-1	WFC3/IR	1	12-Dec-2015 21:01:32.0	yes
02	(2) COSMOS-Z9-2	WFC3/IR	1	12-Dec-2015 21:01:33.0	yes

2 Total Orbits Used

ABSTRACT

At present, little is known about the spectral properties, stellar masses, or even just volume densities of the brightest, most massive galaxies in the early universe. The extreme rarity of such galaxies makes it very difficult to collect sizable samples and make progress in our understanding these sources. In one recent effort, we made use of a 750 arcmin**2 search over all 5 CANDELS fields with follow-up observations from an HST program

to increase present samples of bright (H<27), z>~9-11 galaxies from 6 to 16. Yet, no credible z>~9 galaxies were identified that were brighter than 25.9 mag, consistent with the low volume density of such galaxies expected in even 1000 arcmin**2 surveys. To make further progress we are forced to search for especially bright galaxies at slightly lower redshift, z=8-9. By exploiting the wide-area CANDELS HST+Spitzer survey, we recently identified 3 tantalizing sources. While the first of these galaxies was spectroscopically confirmed (z=8.683), the nature of the other 2 candidates is uncertain, but they are consistent with being z~8.5 galaxies. If confirmed, this would imply a higher than expected number density of bright z~8-10 galaxies and signify a departure from a Schechter luminosity function. If these sources are at z~2 instead, this would imply more of an exponential cut-off at the bright end for z>8 LFs. Here we propose to answer this question with a small request for HST follow-up imaging. This will not only give us insight into feedback and dust extinction in early massive galaxy evolution, but will provide crucial input to optimize current searches for bright z>8 galaxies in preparation for JWST.

OBSERVING DESCRIPTION

The proposed observations are to test the nature of two plausible z>8 galaxies, for which we do not have deep HST observations at 1 micron to determine if the apparent Lyman-break is robust. These sources are of interest because they would both be ~2x brighter than any apparently reliable z~9 galaxies identified over the 5 CANDELS fields.

The most powerful way of determining whether these candidates are likely at z~9 is by obtaining deep observation just blueward of the apparent Lyman-break at a wavelength of ~1 micron in the F098M filter which lies just blueward of the break for z>8 galaxies. All expected contaminants would show a modest amount of flux at this wavelength, while bona-fide z>8 galaxies would not.
We can obtain tight constraints on the nature of these sources if we reach 3 magnitudes fainter than the near-IR continuum at 1 micron. This requires that we reach ~28 mag in the F098M-band at 1 sigma. We can accomplish this for each candidate with just a 1 orbit observation.

Each of the 2 visits in our program is split into 4 ~640-second exposures oriented around a 1"-arcsec square dither pattern. SPARS100 or SPARS50 is adopted as the acquisition mode, given its overall efficiency and broad use in other HST programs.

Visit

Proposal 14459, Visit 01

Sun Dec 13 02:01:34 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: (none)

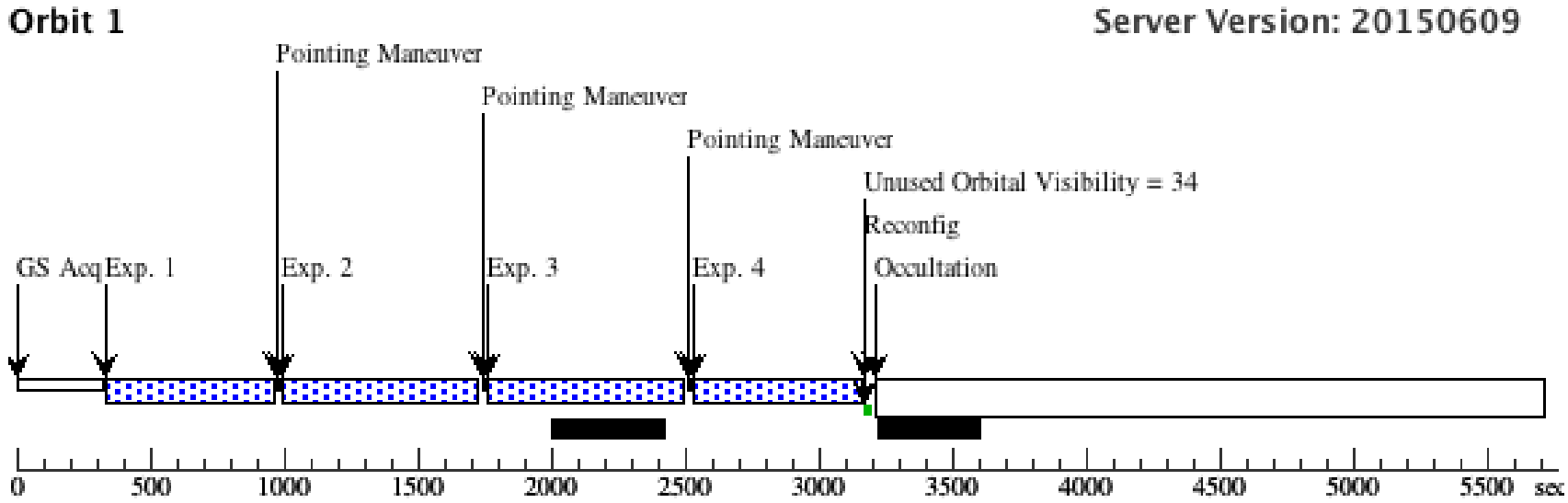
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	COSMOS-Z9-1	RA: 10 00 31.3870 (150.1307792d) Dec: +02 26 39.80 (2.44439d) Equinox: J2000		V=25	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) COSMOS-Z9-1	WFC3/IR, MULTIACCUM, IR-FIX	F098M	NSAMP=7; SAMP-SEQ=SPARS100	POS TARG 0.5,0.75		602.934229 Secs (602.934 Secs) *[==>]*	*[1]*
2		(1) COSMOS-Z9-1	WFC3/IR, MULTIACCUM, IR-FIX	F098M	NSAMP=8; SAMP-SEQ=SPARS100	POS TARG -0.75,0.5		702.934552 Secs (702.935 Secs) *[==>]*	*[1]*
3		(1) COSMOS-Z9-1	WFC3/IR, MULTIACCUM, IR-FIX	F098M	NSAMP=8; SAMP-SEQ=SPARS100	POS TARG -0.5,-0.75		702.934552 Secs (702.935 Secs) *[==>]*	*[1]*
4		(1) COSMOS-Z9-1	WFC3/IR, MULTIACCUM, IR-FIX	F098M	NSAMP=13; SAMP-SEQ=SPARS50	POS TARG 0.75,-0.5		602.937703 Secs (602.938 Secs) *[==>]*	*[1]*

Orbit Structure



Visit

Proposal 14459, Visit 02 Sun Dec 13 02:01:34 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: ORIENT 39D TO 45 D

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	COSMOS-Z9-2	RA: 10 00 17.2400 (150.0718333d) Dec: +02 13 42.00 (2.22833d) Equinox: J2000		V=25	Reference Frame: ICRS

Comments: Extended=NO

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(2) COSMOS-Z9-2	WFC3/IR, MULTIACCUM, IR-FIX	F098M	NSAMP=8; SAMP-SEQ=SPARS100	POS TARG 0.5,0.75		702.934552 Secs (702.935 Secs) *[==>]*	*[1]*
2		(2) COSMOS-Z9-2	WFC3/IR, MULTIACCUM, IR-FIX	F098M	NSAMP=8; SAMP-SEQ=SPARS100	POS TARG -0.75,0.5		702.934552 Secs (702.935 Secs) *[==>]*	*[1]*
3		(2) COSMOS-Z9-2	WFC3/IR, MULTIACCUM, IR-FIX	F098M	NSAMP=7; SAMP-SEQ=SPARS100	POS TARG -0.5,-0.75		602.934229 Secs (602.934 Secs) *[==>]*	*[1]*
4		(2) COSMOS-Z9-2	WFC3/IR, MULTIACCUM, IR-FIX	F098M	NSAMP=13; SAMP-SEQ=SPARS50	POS TARG 0.75,-0.5		602.937703 Secs (602.938 Secs) *[==>]*	*[1]*

Orbit Structure