15931 - Do ultra-luminous star-forming galaxies exist at z ~ 9?

Cycle: 27, 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) UVISTA-1307	WFC3/IR	1	22-Jul-2019 13:00:12.0	yes
02	(2) UDS-603	WFC3/IR	1	22-Jul-2019 13:00:13.0	yes

2 Total Orbits Used

ABSTRACT

The study of the most luminous star-forming galaxies at z > 7 has the potential to reveal key properties of reionization, as these sources likely occupy highly ionised regions within a predominantly neutral Universe. The number of bright sources however remains uncertain, due primarily to their rarity over the small area deep surveys typically used to detect them. We have expanded the search for bright z ~ 9 Lyman-break galaxies using the full 2 deg2 of deep ground-based optical/NIR photometry in the COSMOS and UDS fields, resulting in the selection of two extremely luminous galaxy candidates with best-fitting photometric redshifts at z ~ 9 and mAB < 24.5. Despite being the most robust z > 8 objects in our full SED fitting analysis, unfortunately current and future ground-based Y-band data in these two fields is insufficient to exclude the possibility that these objects are

galactic brown dwarf interlopers. Due to the atmospheric transmission, the ground-based Y-bands peak too far to the blue, meaning the sharp expected Lyman-break cannot be confirmed. With a single orbit of HST/WFC3 imaging in the F105W (wide YJ) band it is possible to determine the high-redshift nature of these sources, as this filter efficiently targets below the expected Lyman-break where interloper objects will be detected. If confirmed, the existence of these ultra-luminous galaxies provides a clear challenge to current simulations. Furthermore, these galaxies will provide a unique insight into the EoR due to their accessibility for follow-up both with JWST and ALMA, where HST/WFC3 F105W data is essential for FIR line measurements that require precise photometric redshifts.

OBSERVING DESCRIPTION

The 2 objects we will imaging with HST/WFC3 are widely separated, hence we require 2 separate pointings. Each object is imaged for one orbit and in a single visit. The F105W filter is used with a simple 4 point dither pattern to enable improved PSF reconstruction, splitting each orbit into four separate exposures of ~ 600s each. We use the SPARS50 sampling rate with NSAMP = 14 to ensure a high number of non-destructive reads for cosmic ray rejection.

Impact of reduced-gyro operations:

In the event of reduced gyro mode (RGM) on these observations, the UDS -603 target would be out of the field of regard (reference slide 5 of J. Mackenty's slides, 6/6/16).

For target UVISTA-1307 however we envision little impact of RGM on obtaining the proposed data. As we are only interested in the photometry of this source, the orientation of the observations is not set. Furthermore, the increased aquision time of approx. 120 seconds would not affect our integration time, as we currently have 169 seconds "free" in the orbit plan for this object (filling the orbit with more shorter integrations to reduce this did not increase the exposure time, or SN, hence this spare time). We have no coordinated observations, and only one visit of one orbit is required.

Visit

Proposal 15931, First visit (01) Mon Jul 22 17:00:13 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: (none)

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

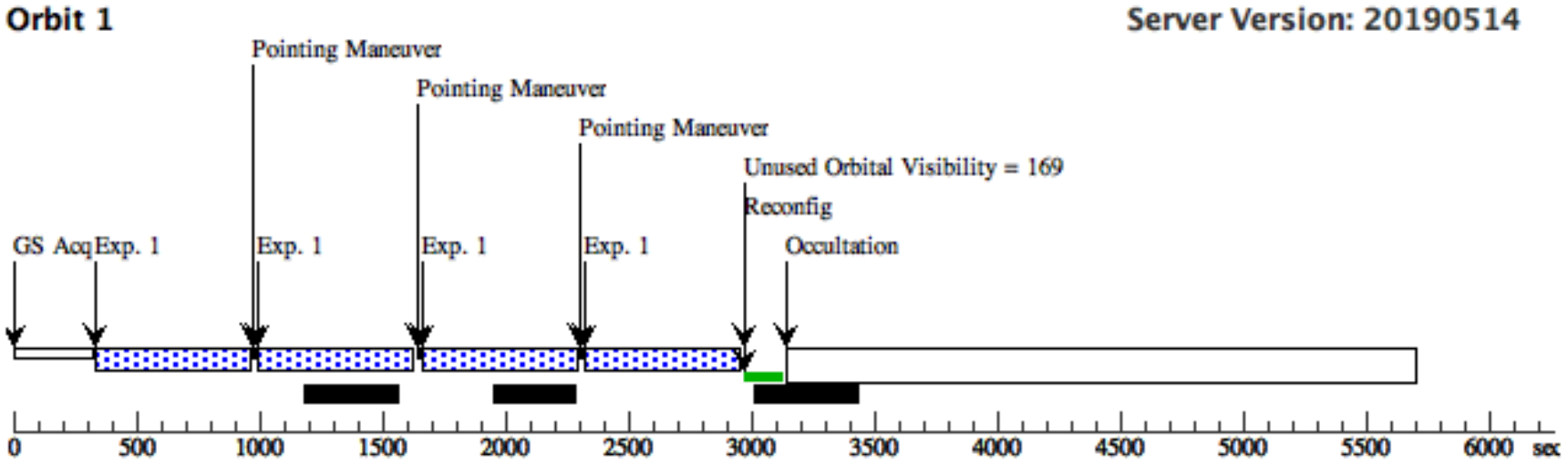
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	UVISTA-1307	RA: 10 02 31.8100 (150.6325417d) Dec: +02 31 17.10 (2.52142d) Equinox: J2000		V=(?) Total H-band magnitude of 24.4	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[HIGH REDSHIFT GALAXY]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) UVISTA-1307	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=13; SAMP-SEQ=SPARS50		Pattern 1, Exps 1-1 in First visit (01) (1)	602.937703 Secs (2411.751 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	*[1]*

Orbit Structure



Visit

Proposal 15931, Second visit (02) Mon Jul 22 17:00:14 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: (none)

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
(2)	UDS-603	RA: 02 17 42.4700 (34.4269583d) Dec: -04 58 57.80 (-4.98272d) Equinox: J2000		V=(?) Total H-band magnitude of 24.8	Reference Frame: ICRS

Comments:
Category=GALAXY
Description=[HIGH REDSHIFT GALAXY]

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(2) UDS-603	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=13; SAMP-SEQ=SPARS50		Pattern 1, Exps 1-1 in Second visit (02) (1)	602.937703 Secs (2411.751 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	*[1]*

Orbit Structure