14083 - The nature and environment of the most luminous starburst galaxies at redshift > 5

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) RARE-HELMS-34	WFC3/IR	2	24-Jul-2015 21:15:53.0	yes
02	(2) RARE-HELMS-65	WFC3/IR	2	24-Jul-2015 21:15:55.0	yes
03	(3) RARE-XMM-30	WFC3/IR	2	24-Jul-2015 21:15:57.0	yes

6 Total Orbits Used

ABSTRACT

We propose HST WFC3 imaging of the brightest three recently discovered, dusty star forming galaxies at z > 5, selected from the Herschel HerMES survey and with CO redshifts measured with ALMA in a cycle 2 program. Theoretically, the existence of dusty, massive startbursts at such early epochs is difficult to explain and thorough observational constraints on their properties provides a stringent test of galaxy formation models. Our targets have a multitude of far-infrared follow-up data, including SMA and NOEMA observations and the CO spectroscopy in the 3mm ALMA band that revealed their extreme redshifts. However, the currently available ground-based, near-IR observations are shallow and lack the resolution and sensitivity of HST at these wavelengths, which is needed to completely reveal these rare galaxies, and to measure any gravitational lensing amplification. We will use the proposed data to measure the physical properties of these three z > 5 dusty starbursts, including their sizes, stellar masses, and the scale and intensity of the star formation. There is also evidence of gravitational lensing and the HST data are crucial for accurately measuring the lensing amplification and reconstructing the source plane. The wider field data will be used to investigate the environments of these galaxies and determine whether they are protocluster members, as often expected of massive high-redshift galaxies and similarly to some other z ~ 4 - 5 starbursts. We will be able to measure the dark matter halo mass scale and thereby consider the evolution and descendent of these galaxies, particularly in comparison with lower redshift dusty starbursts.

OBSERVING DESCRIPTION

We require WFC3 observations with the F105W and F160W filters of three dusty z>5 target galaxies. For all three targets WFC3 observations in each filter will be completed in a single orbit. (Total = 6 WFC3 orbits)

For the WFC3 observations we calculate predicted F105W and F160W fluxes of our targets by scaling the SED of Arp220 to the observed farinfrared fluxes, fixed to the CO redshifts. As described in the proposal, there is some exvidence of the targets being marginally resolved in existing low SNR data, and therefore the required WFC3 exposure times are ~4x those calculated from the fluxes alone, and ~4x those in each of the ETC references.

There are no constraints on observing date or orientation.

Visit

Proposal 14083, Visit 01 Sat Jul 25 01:15:59 GMT 2015

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), (3)

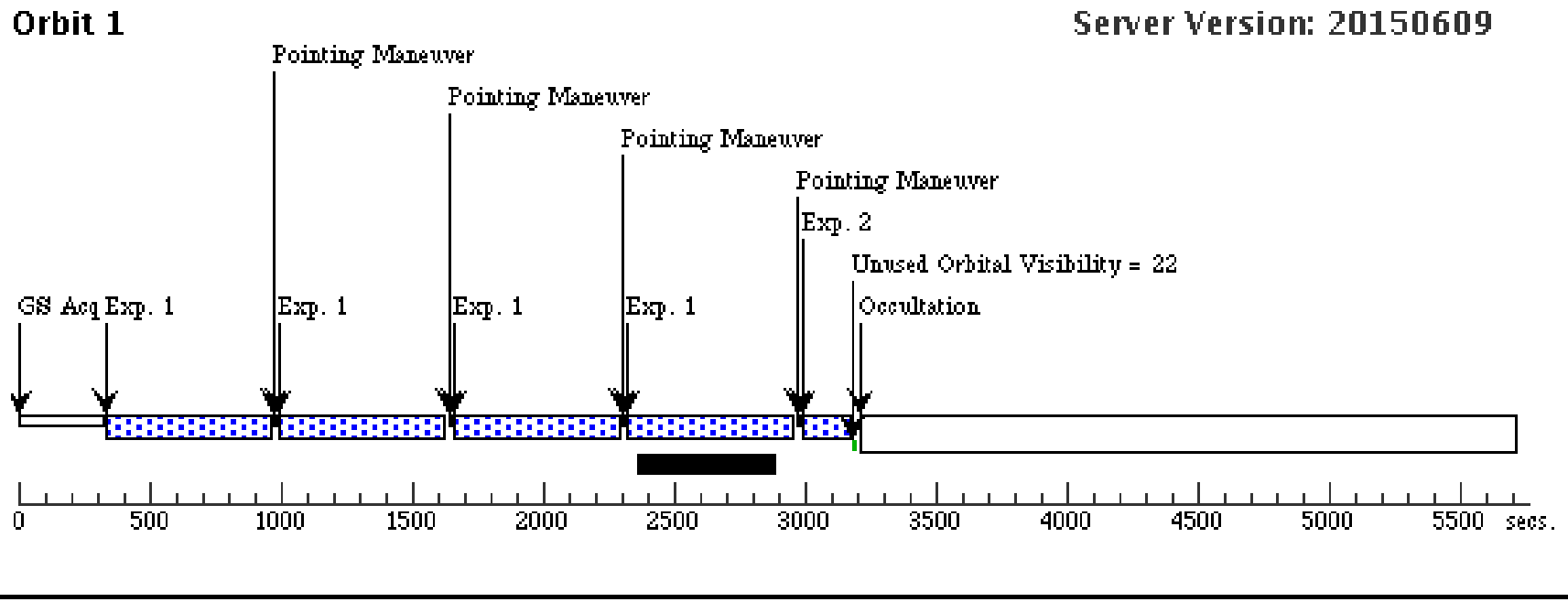
Fixed Targets

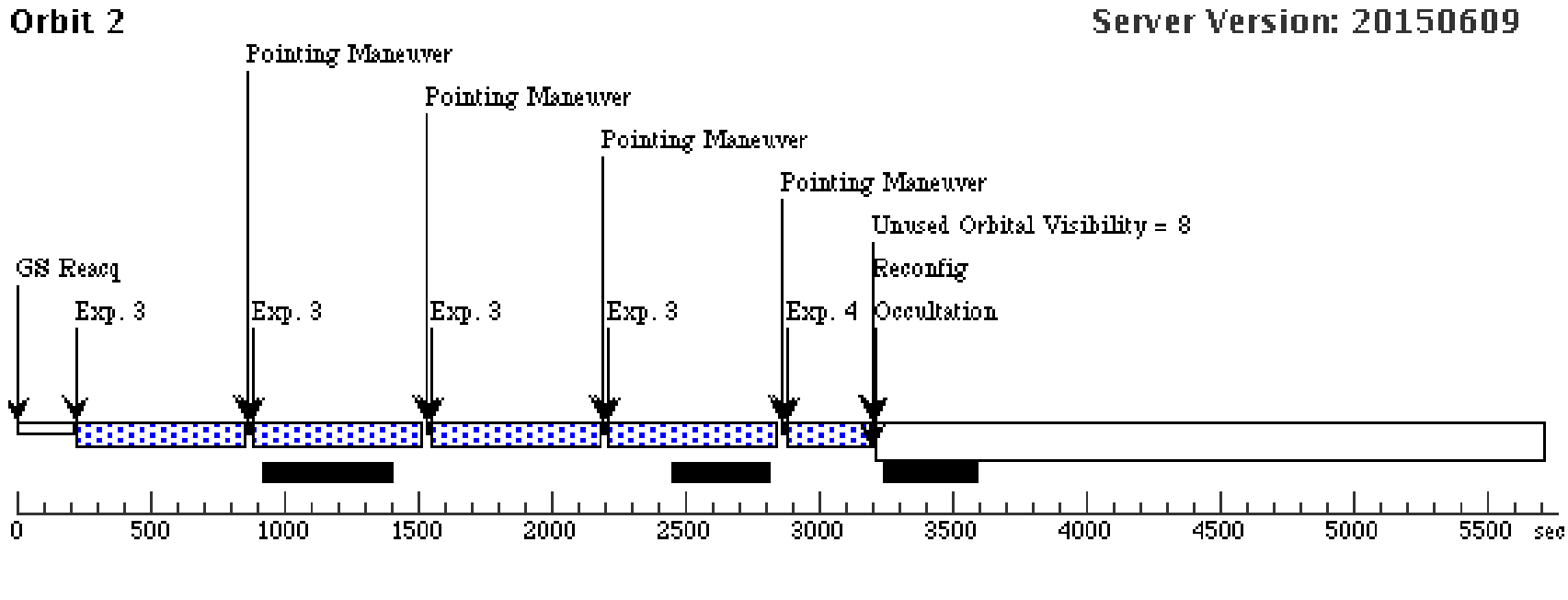
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	RARE-HELMS-34	RA: 00 22 20.8080 (5.5867000d) Dec: -01 55 20.90 (-1.92247d) Equinox: J2000		V=25	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) RARE-HELMS-34	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=SPARS100; NSAMP=7		Pattern 1, Exps 1-1 in Visit 01 (1)	602.934229 Secs (2411.737 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
2		(1) RARE-HELMS-34	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=7; SAMP-SEQ=SPARS25			152.935381 Secs (152.935 Secs) *[==>]*	***[1]***
3		(1) RARE-HELMS-34	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=7; SAMP-SEQ=SPARS100		Pattern 1, Exps 3-3 in Visit 01 (1)	602.934229 Secs (2411.737 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[2]***
4		(1) RARE-HELMS-34	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=12; SAMP-SEQ=SPARS25			277.937956 Secs (277.938 Secs) *[==>]*	***[2]***

Orbit Structure





Visit

Proposal 14083, Visit 02 Sat Jul 25 01:15:59 GMT 2015

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), (3)

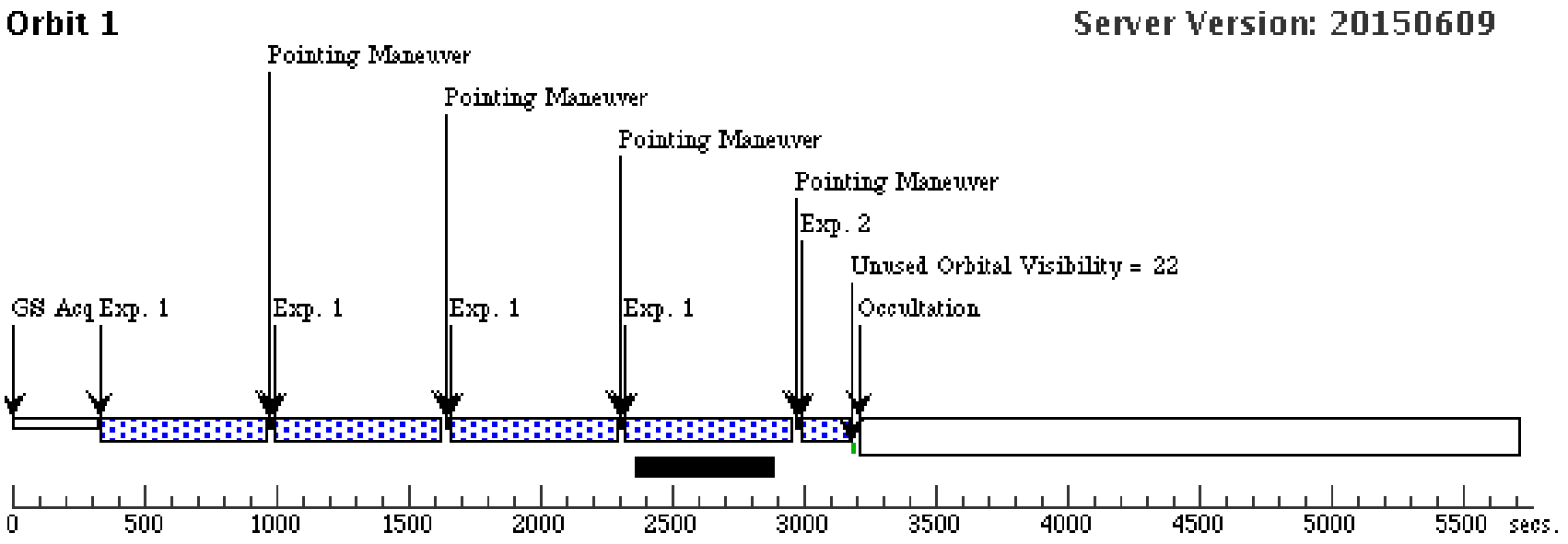
Fixed Targets

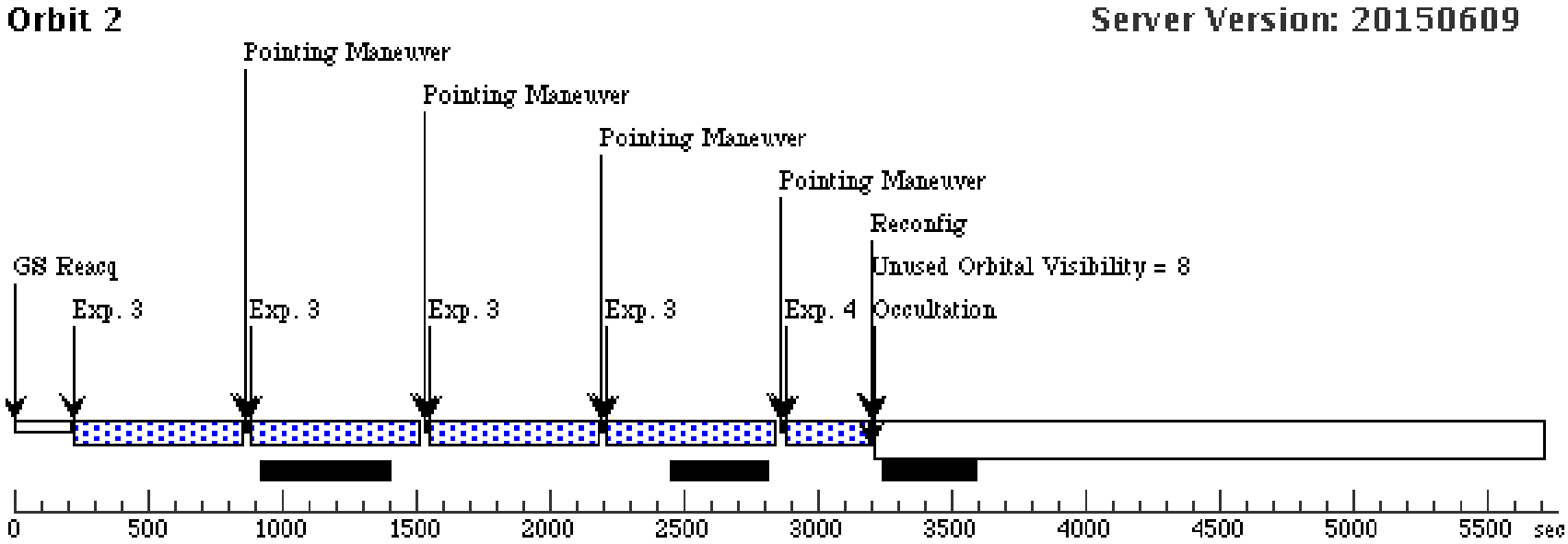
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	RARE-HELMS-65	RA: 00 27 39.2380 (6.9134917d) Dec: -02 07 49.34 (-2.13037d) Equinox: J2000		V=25	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(2) RARE-HELMS-65	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=SPARS100; NSAMP=7		Pattern 1, Exps 1-1 in Visit 02 (1)	602.934229 Secs (2411.737 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
2		(2) RARE-HELMS-65	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=7; SAMP-SEQ=SPARS25			152.935381 Secs (152.935 Secs) *[==>]*	***[1]***
3		(2) RARE-HELMS-65	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=7; SAMP-SEQ=SPARS100		Pattern 1, Exps 3-3 in Visit 02 (1)	602.934229 Secs (2411.737 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[2]***
4		(2) RARE-HELMS-65	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=12; SAMP-SEQ=SPARS25			277.937956 Secs (277.938 Secs) *[==>]*	***[2]***

Orbit Structure





Visit

Proposal 14083, Visit 03 Sat Jul 25 01:15:59 GMT 2015

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), (3)

Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(3)	RARE-XMM-30	RA: 02 26 56.5610 (36.7356708d) Dec: -03 27 8.69 (-3.45241d) 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		(3) RARE-XMM-30	WFC3/IR, MULTIACCUM, IR	F160W	SAMP-SEQ=SPARS100; NSAMP=7		Pattern 1, Exps 1-1 in Visit 03 (1)	602.934229 Secs (2411.737 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
2		(3) RARE-XMM-30	WFC3/IR, MULTIACCUM, IR	F160W	NSAMP=7; SAMP-SEQ=SPARS25			152.935381 Secs (152.935 Secs) *[==>]*	***[1]***
3		(3) RARE-XMM-30	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=7; SAMP-SEQ=SPARS100		Pattern 1, Exps 3-3 in Visit 03 (1)	602.934229 Secs (2411.737 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[2]***
4		(3) RARE-XMM-30	WFC3/IR, MULTIACCUM, IR	F105W	NSAMP=12; SAMP-SEQ=SPARS25			277.937956 Secs (277.938 Secs) *[==>]*	***[2]***

Orbit Structure