13384 - A Simultaneous Measurement of the Cold Gas, Star Formation Rate, and Stellar Mass Histories of the Universe

Cycle: 21, 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) CODEEPFIELD	ACS/WFC	1	11-Jul-2013 18:21:11.0	yes
02	(1) CODEEPFIELD	WFC3/IR	3	11-Jul-2013 18:21:23.0	yes

4 Total Orbits Used

ABSTRACT

We have recently initiated a study that has the potential to fundamentally change our picture of galaxy evolution. Using the Jansky Very Large Array, we target a "Molecular Deep Field" to measure, for the first time, the unbiased cosmic evolution of the gas content of galaxies ("Cold Gas History of the Universe") at high redshift. We here request HST ACS and WFC3/IR observations to determine the rest-frame optical morphologies and spatially resolved star formation and stellar mass properties of the galaxies in this region to simultaneously measure the cold gas, star formation rate and stellar mass histories of the universe in a common legacy field. The high resolution and sensitivity of the HST data will allow us to directly tie the gas content, gas fractions, and star formation rates to the structural properties of galaxies. This will provide a deeper understanding of the drivers of star formation and stellar bulge/disk growth based and their connection to the gas supply and dynamics in galaxies, as well as the relative importance of mergers vs. passively evolving galaxies. The proposed inexpensive study will also enable us to study the star formation properties of the most distant spectroscopically confirmed galaxy protocluster at z=5.3. With ALMA, we have serendipitously discovered a new population of [CII]-luminous, otherwise undetected galaxies at the redshift of this protocluster. The proposed WFC3/IR data will likely be deep enough to detect the rest-frame UV emission from these enigmatic galaxies, enabling us to investigate their true nature.

OBSERVING DESCRIPTION

Program uses 4 orbits, 3 with WFC3/IR in the F125W and F160W filters, and 1 with ACS/WFC and the F606W filter.
It is broken up into two visits, one consisting of the single ACS orbit, and the other consisting of the three WFC3 IR orbits (concatenated to ensure similar rotation angles between orbits, and thus, coverage of the same galaxies in both filters - this is not an issue for ACS, given the much larger field of view relative to WFC3, it will cover the full area of interest at any orientation angle). There is no restriction on the orientation angle.

All observations are of the same target field (CODEEPFIELD). 4-point position/readout dither patterns are employed, primarily to improve the PSF through subpixel sampling, i.e., to mitigate the effects of the large detector pixel sizes (especially for WFC3/IR), as well as to offset by a sufficiently large amount to move persistent pixels to different locations on the sky in each exposure, and to provide good cosmic ray rejection. For ACS/WFC, this is also important to cover the 50 pixel gap in y direction between the two detector chips.

The ACS/WFC dither pattern consists of 2 positions with offset large enough to cover the inter-chip gap, and 2 subpositions each to dither on subpixel scales.
The WFC3/IR dither patterns consist of 2 postions large enough to cover the "death star" feature, and 2 subpositions each to dither on subpixel scales.

For the one F125W orbit, 4 positions are targeted. For the two F160W orbits, each orbit contains two subpixel dither positions, and the larger re-positioning is done between orbits.

Visit

Proposal 13384, ACS WFC Exposure (01) Thu Jul 11 22:21:31 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=2 Point Spacing=3.011 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.28 Angle Between Sides= Center Pattern=false	Pattern Type=LINE Purpose=BACKGROUND Number Of Points=2 Point Spacing=0.149 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=34.25 Angle Between Sides= Center Pattern=false	(1)

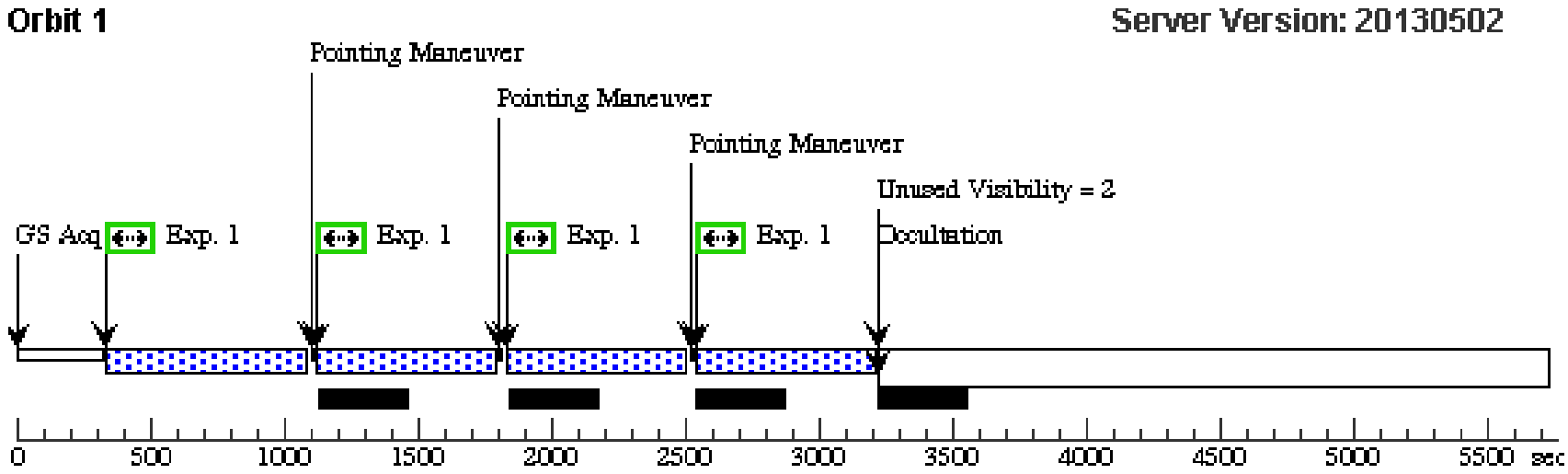
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	CODEEPFIELD	RA: 10 00 20.7000 (150.0862500d) Dec: +02 35 20.50 (2.58903d) Equinox: J2000		V=25+/-0.5	Reference Frame: ICRS

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) CODEEPFIELD	ACS/WFC, ACCUM, WFC	F606W	CR-SPLIT=NO		Pattern 1, Exps 1-1 in ACS WFC Exposure (01) (1)	549 Secs (2196 Secs) *[==>(Pattern 1,1)]* *[==>(Pattern 1,2)]* *[==>(Pattern 2,1)]* *[==>(Pattern 2,2)]*	*[1]*

Orbit Structure



Visit

Proposal 13384, WFC3 IR Exposure (02) Thu Jul 11 22:21:33 GMT 2013

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: (none)

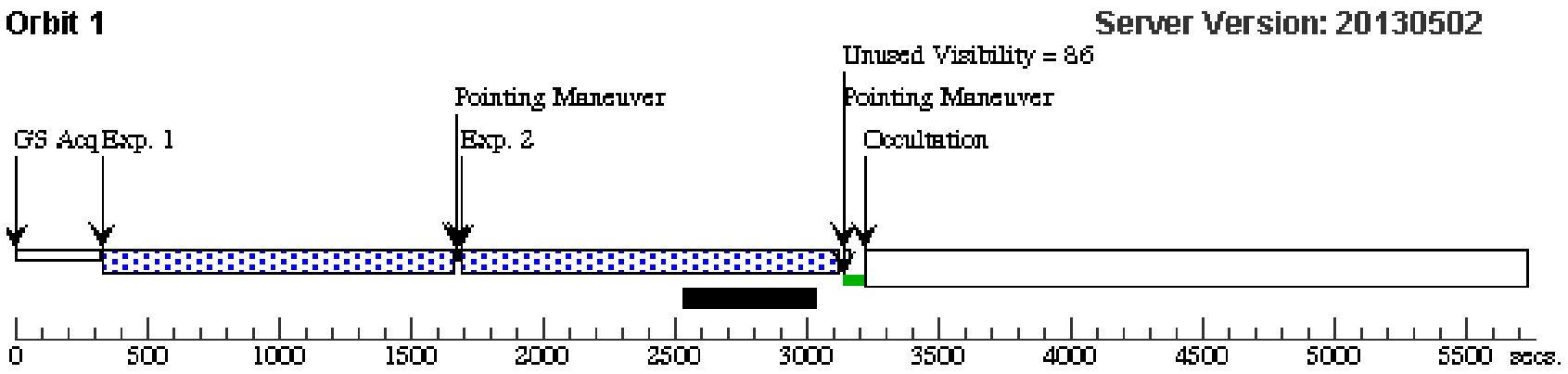
Fixed Targets

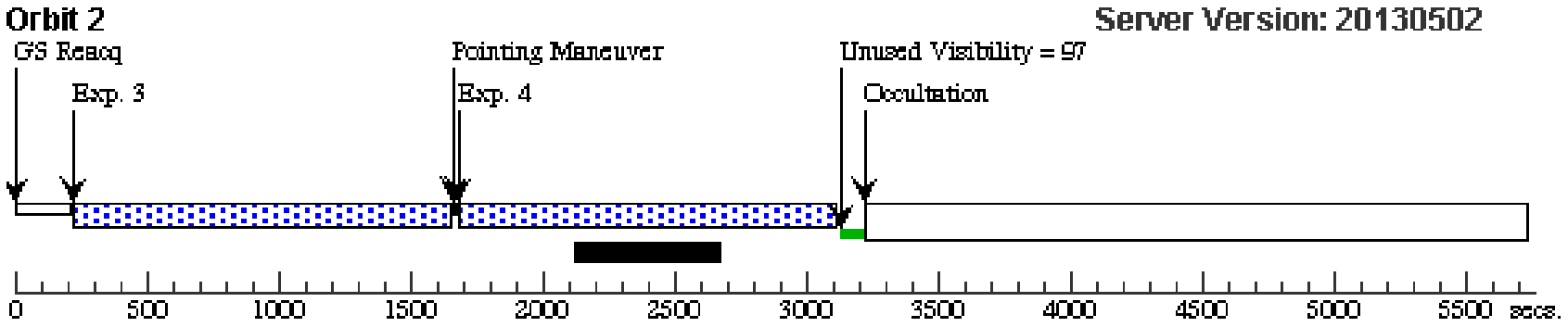
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	CODEEPFIELD	RA: 10 00 20.7000 (150.0862500d) Dec: +02 35 20.50 (2.58903d) Equinox: J2000		V=25+/-0.5	Reference Frame: ICRS

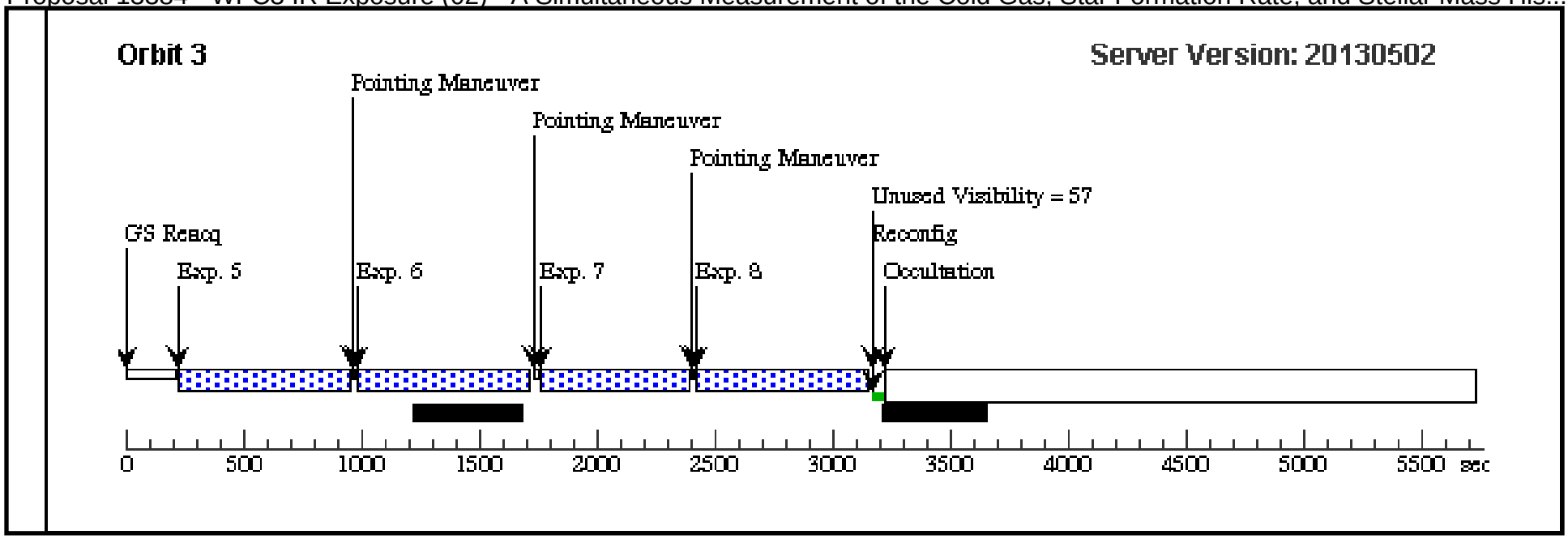
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	Dither 1 Pos 1	(1) CODEEPFIELD	WFC3/IR, MULTIACCUM, IR-FIX	F160W	NSAMP=14; SAMP-SEQ=SPARS100	POS TARG -3.3875, -3.0275		1302.93649 Secs (1302.936 Secs) *[==>]*	*[1]*
2	Dither 2 Pos 1	(1) CODEEPFIELD	WFC3/IR, MULTIACCUM, IR-FIX	F160W	NSAMP=15; SAMP-SEQ=SPARS100	POS TARG -3.8615, -3.4515		1402.936813 Secs (1402.937 Secs) *[==>]*	*[1]*
3	Dither 1 Pos 2	(1) CODEEPFIELD	WFC3/IR, MULTIACCUM, IR-FIX	F160W	NSAMP=15; SAMP-SEQ=SPARS100	POS TARG 3.3875,3.0275		1402.936813 Secs (1402.937 Secs) *[==>]*	*[2]*
4	Dither 2 Pos 2	(1) CODEEPFIELD	WFC3/IR, MULTIACCUM, IR-FIX	F160W	NSAMP=15; SAMP-SEQ=SPARS100	POS TARG 3.8615,3.4515		1402.936813 Secs (1402.937 Secs) *[==>]*	*[2]*
5	Dither 2 Pos 2	(1) CODEEPFIELD	WFC3/IR, MULTIACCUM, IR-FIX	F125W	NSAMP=8; SAMP-SEQ=SPARS100	POS TARG 3.8615,3.4515		702.934552 Secs (702.935 Secs) *[==>]*	*[3]*
6	Dither 1 Pos 2	(1) CODEEPFIELD	WFC3/IR, MULTIACCUM, IR-FIX	F125W	NSAMP=8; SAMP-SEQ=SPARS100	POS TARG 3.3875,3.0275		702.934552 Secs (702.935 Secs) *[==>]*	*[3]*
7	Dither 1 Pos 1	(1) CODEEPFIELD	WFC3/IR, MULTIACCUM, IR-FIX	F125W	NSAMP=7; SAMP-SEQ=SPARS100	POS TARG -3.3875, -3.0275		602.934229 Secs (602.934 Secs) *[==>]*	*[3]*
8	Dither 2 Pos 1	(1) CODEEPFIELD	WFC3/IR, MULTIACCUM, IR-FIX	F125W	NSAMP=8; SAMP-SEQ=SPARS100	POS TARG -3.8615, -3.4515		702.934552 Secs (702.935 Secs) *[==>]*	*[3]*

Orbit Structure



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Pointing Maneuver
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GS Reacq
Reconfig
Exp. 5
Exp. 6
Exp. 7
Exp. 8
Occultation
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