14205 - Early Quiescent Galaxies Under the Magnifying Glass

Cycle: 23, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

Name	*Institution*	*E-Mail*
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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) MACSJ0150.3-1005	WFC3/IR	1	07-Oct-2015 21:20:40.0	yes
02	(2) PSZ1-G295.24-21.55	WFC3/IR	1	07-Oct-2015 21:20:42.0	yes
03	(2) PSZ1-G295.24-21.55	ACS/WFC	2	07-Oct-2015 21:20:44.0	yes

4 Total Orbits Used

ABSTRACT

By a redshift of z~2, half of the massive galaxy (>10^11 Msol) population consists of systems with little or no star formation and physical sizes that are remarkably small (~1 kpc) for their mass. Much effort has been devoted to understanding the star-forming progenitors of these "red nuggets" and their substantial growth in size over the last 11 Gyr. However, major questions remain. A key barrier is our inability to resolve the structure and dynamics of these compact galaxies, which are only marginally resolved even with HST. This proposal addresses this limitation by harnessing gravitational lensing. We propose observations of two spectroscopically confirmed quiescent galaxies at z=2-3 that are magnified by foreground clusters. By coupling this magnification with HST resolution, our proposed observations with allow us to: (1) Resolve the central stellar densities of

these galaxies within half of the effective radius, thereby stringently testing the hypothesized "inside out" growth paradigm and constraining the physical mechanisms driving size growth; (2) Probe the homogeneity of the stellar populations of these compact galaxies by measuring color gradients within ~1 kpc; (3) Construct lens models to interpret existing spatially-resolved NIR spectroscopy and measure resolved stellar kinematics for the first time in these systems. Our proposed targets are rare and valuable resources that provide the only route toward better resolving the internal structure of z>2 quiescent galaxies in advance of JWST.

OBSERVING DESCRIPTION

MACSJ0150.3-1005: One orbit of WFC3-IR imaging is divided between F160W and F125W filers. A four-point dither pattern is used for each filter to achieve optimal subpixel sampling. The BCG of the cluster is placed at the center of the array.

PSZ1-G295.24-21.55: One orbit of WFC3-IR imaging is divided between F160W and F105W filters and is otherwise the same as for MACSJ0150 above. Two orbits of ACS imaging are equally divided between the F814W and F555W filters. Each ACS orbit employs a three-point ACS-WFC-DITHER-LINE pattern in order to span the chip gap and provide CR rejection. The BCG complex is placed at the WFC aperture above the chip gap. 2015 October 5: Added some ORIENT restrictions to avoid diffraction spikes from H~11 stars potentially affecting the main target in the WFC3-IR observations, as suggested by Contact Scientist Russell Ryan. These should not reduce schedulability.

Visit

Proposal 14205, MACSJ0150 WFC3 (01), implementation Thu Oct 08 01:20:45 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), (2)

Fixed Targets

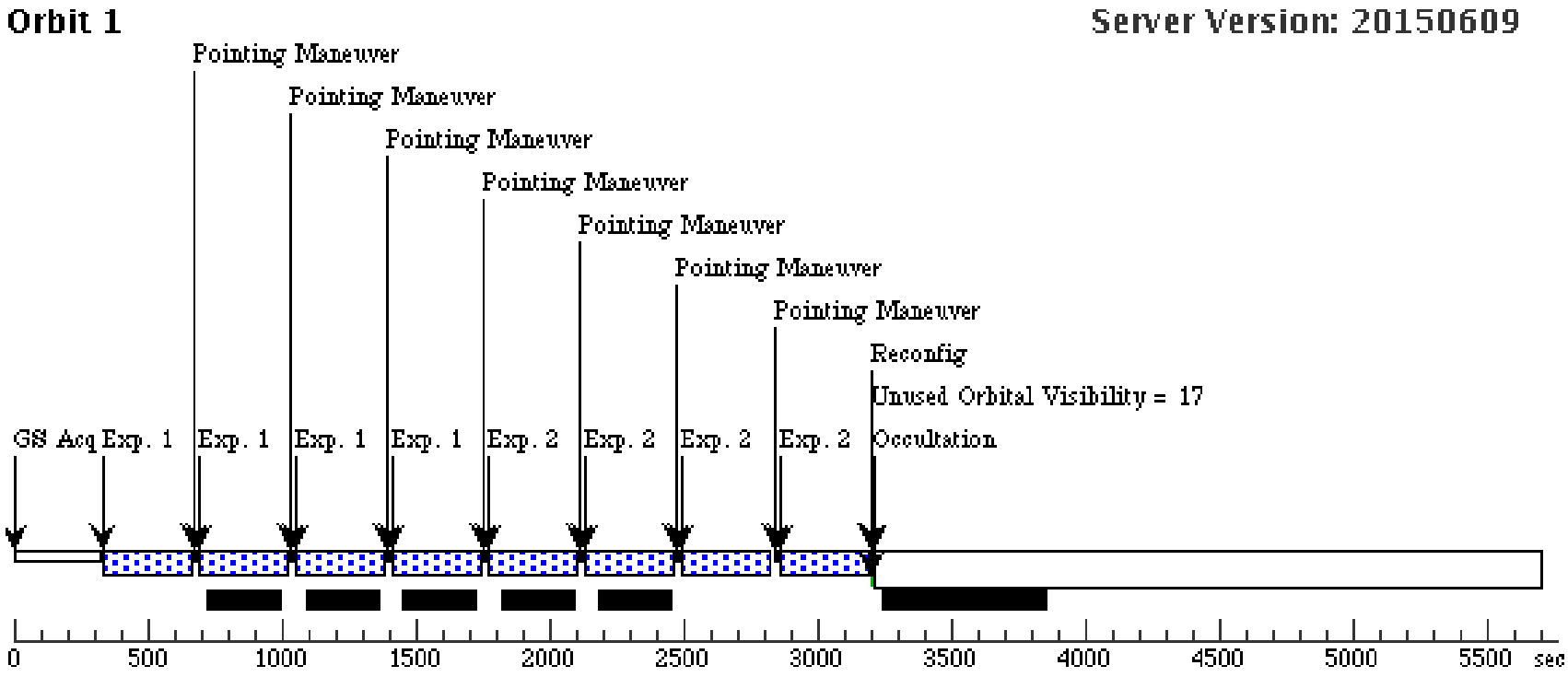
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	MACSJ0150.3-1005	RA: 01 50 21.2700 (27.5886250d) Dec: -10 05 30.00 (-10.09167d) Equinox: J2000	Redshift: 0.365	V=20	Reference Frame: ICRS

Comments: Centered on BCG.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) MACSJ0150.3-1005	WFC3/IR, MULTIACCUM, IR-FIX	F160W	NSAMP=11; SAMP-SEQ=STEP50	GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-1 in MACSJ0150 WFC3 (01) (1)	299.232481 Secs (1196.93 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	 ***[1]***
2		(1) MACSJ0150.3-1005	WFC3/IR, MULTIACCUM, IR-FIX	F125W	NSAMP=11; SAMP-SEQ=STEP50		Pattern 1, Exps 2-2 in MACSJ0150 WFC3 (01) (1)	299.232481 Secs (1196.93 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	 ***[1]***

Orbit Structure



Visit

Proposal 14205, G295 WFC3 (02), implementation Thu Oct 08 01:20:46 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/IR

Special Requirements: ORIENT 38D TO 49 D; ORIENT 59D TO 118 D; ORIENT 128D TO 139 D; ORIENT 149D TO 208 D; ORIENT 218D TO 229 D; ORIENT 239D TO 298 D; ORIENT 308D TO 319 D; ORIENT 329D TO 28 D

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), (2)

Fixed Targets

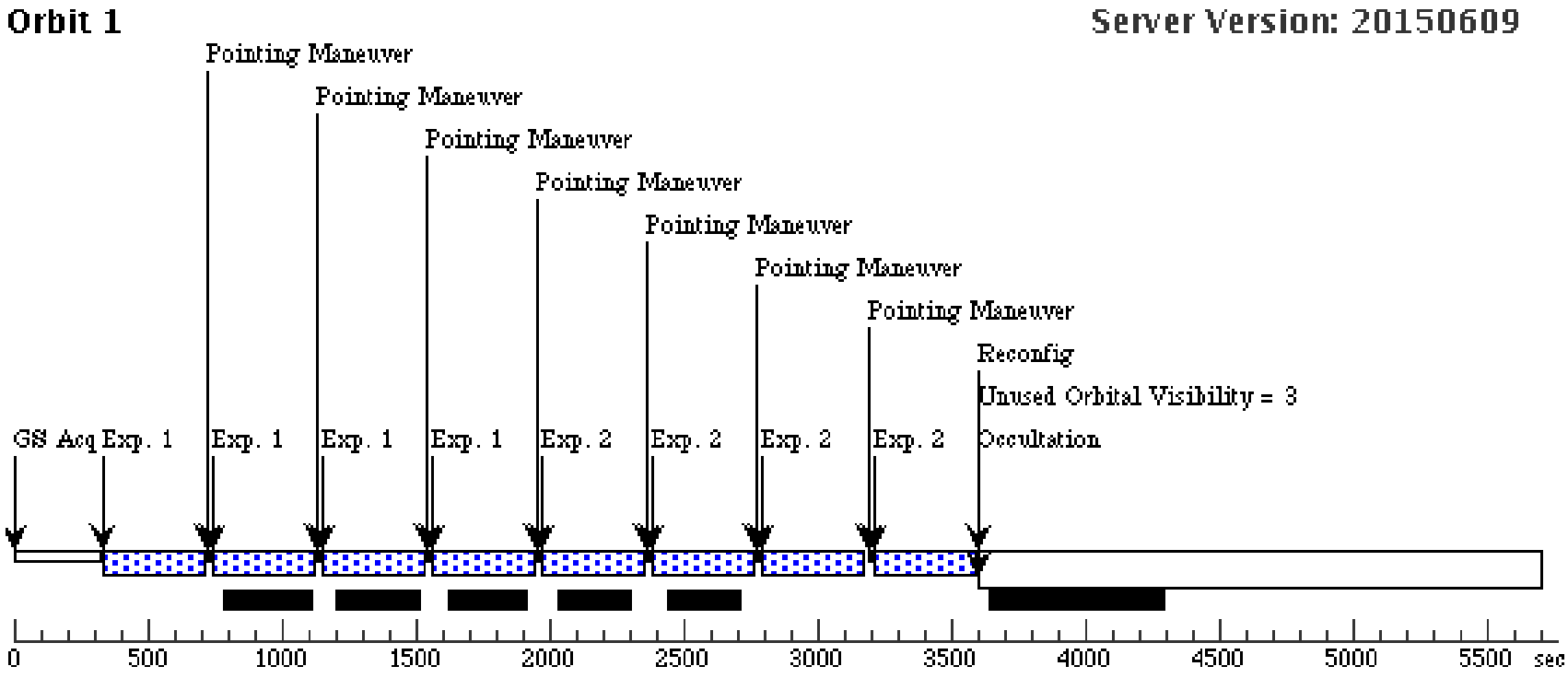
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	PSZ1-G295.24-21.55	RA: 09 18 51.0600 (139.7127500d) Dec: -81 03 4.00 (-81.05111d) Equinox: J2000		V=20	Reference Frame: ICRS

Comments: Centered on BCGs.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(2) PSZ1-G295.24-21.55	WFC3/IR, MULTIACCUM, IR-FIX	F160W	SAMP-SEQ=STEP50; NSAMP=12		Pattern 1, Exps 1-1 in G295 WFC3 (02) (1)	349.232932 Secs (1396.932 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***
2		(2) PSZ1-G295.24-21.55	WFC3/IR, MULTIACCUM, IR-FIX	F105W	NSAMP=12; SAMP-SEQ=STEP50		Pattern 1, Exps 2-2 in G295 WFC3 (02) (1)	349.232932 Secs (1396.932 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]* *[==>(Pattern 4)]*	***[1]***

Orbit Structure



Visit

Proposal 14205, G295 ACS (03), implementation Thu Oct 08 01:20:46 GMT 2015

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(2)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=3.011 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.28 Angle Between Sides= Center Pattern=true		(1), (2)

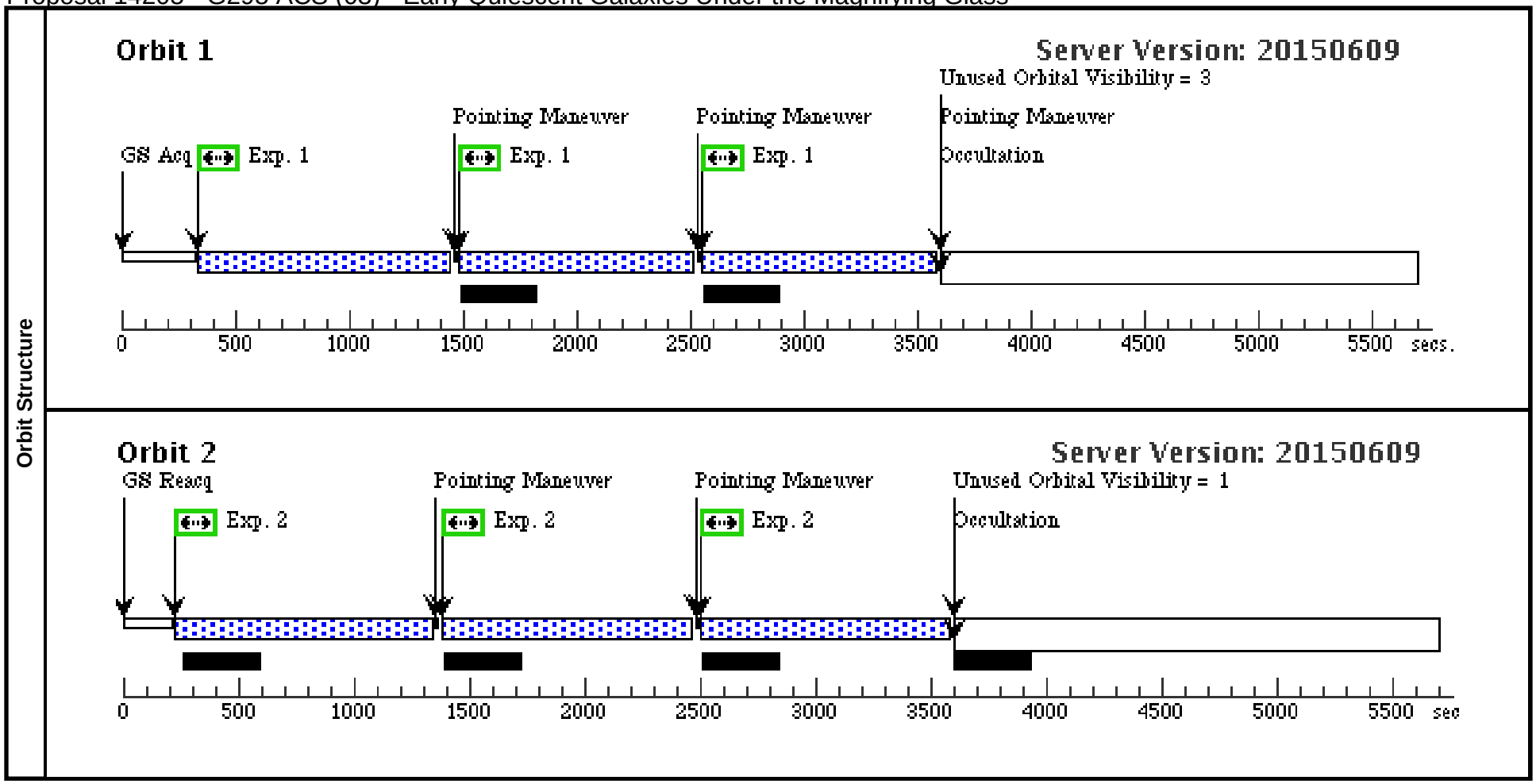
Fixed Targets

#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(2)	PSZ1-G295.24-21.55	RA: 09 18 51.0600 (139.7127500d) Dec: -81 03 4.00 (-81.05111d) Equinox: J2000		V=20	Reference Frame: ICRS

Comments: Centered on BCGs.

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1	F555W	(2) PSZ1-G295.24-21.55	ACS/WFC, ACCUM, WFC	F555W			Pattern 2, Exps 1-1 in G295 ACS (03) (2)	908 Secs (2724 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[1]***
2	F814W	(2) PSZ1-G295.24-21.55	ACS/WFC, ACCUM, WFC	F814W			Pattern 2, Exps 2-2 in G295 ACS (03) (2)	960 Secs (2880 Secs) *[==>(Pattern 1)]* *[==>(Pattern 2)]* *[==>(Pattern 3)]*	***[2]***


Orbit Structure
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Unused Orbital Visibility = 3
GS Acq
Exp. 1
Pointing Maneuver
Exp. 1
Pointing Maneuver
Exp. 1
Pointing Maneuver
Occultation
0
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
secs.
Orbit 2
Server Version: 20150609
GS Reacq
Exp. 2
Pointing Maneuver
Exp. 2
Pointing Maneuver
Exp. 2
Unused Orbital Visibility = 1
Occultation
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500
1000
1500
2000
2500
3000
3500
4000
4500
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5500
sec