



## 15968 - Paths to quiescence: gaseous feeding, morphology and star-formation histories of galaxies from the HST+MUSE Ultra Deep Field

Cycle: 27, Proposal Category: GO

(Availability Mode: SUPPORTED)

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**VISITS**

<i>Visit</i>	<i>Targets used in Visit</i>	<i>Configurations used in Visit</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(6) MUDFQ2139-4434-UV	WFC3/UVIS	4	09-Jul-2019 14:05:36.0	yes
02	(6) MUDFQ2139-4434-UV	WFC3/UVIS	4	09-Jul-2019 14:05:37.0	yes

8 Total Orbits Used

**ABSTRACT**

We propose an 8 orbit WFC3/UVIS F336W imaging program in the MUSE Ultra Deep Field to obtain a deep view of galaxy star formation histories and morphologies at the peak and decline of cosmic star formation ( $z < 2.5$ ). Our program is made unique by two main factors. First, this proposal is built upon the synergy of two public observational programs in this field, a MUSE survey and the deepest HST grism survey with the WFC3/G141 grism. Second, the choice of the field, which hosts several rich galaxy groups at  $z=0.7-1.1$  and two quasars separated by less than 500 kpc at  $z=3.2$ . The quasars act as light beacons to probe the gas in and around the group galaxies, making this field ideal for studies of the interaction of galaxies with their local environment. Taking advantage of the unrivaled HST capabilities in the UV, we aim to observe galaxies transitioning from the star forming main sequence to a passive population. Our goals are twofold. i) We will accurately quantify the recent star formation histories of the galaxies and their dust content, which, when complemented by the gas budget, will unveil the physical processes responsible for the onset of a population of passive objects down to  $10^9 M_{\text{sun}}$  in stellar mass. ii) We will study the morphology of the young stellar populations probed by the rest-frame far-UV images, which compared to the morphologies of the bulk of the stellar emission and of the nebular emission maps (from the WFC3/IR program), will yield a resolved view of the quenching events. This proposal enables new science goals in this unique field, greatly increasing its legacy value for the astrophysical community.

**OBSERVING DESCRIPTION**

This program images the MUSE+HST Ultra Deep Field with the WFC3/UVIS F336W filter to obtain rest-frame UV imaging data. Full orbit integrations are obtained in order to minimize post-flash and read-noise and maximize the total depth. Therefore 4 orbit visits are required to enable fully cleaning the cosmic rays (as described in our phase I). Exposures are post-flashed by  $4e-$  to help mitigate the CTE, and reach  $12e-$  backgrounds per pixel. The dither pattern per visit is set 19 times larger than the default box pattern to help minimize the blotchy pattern observed in F336W imaging (i.e., similar to that seen in Rafelski et al. 2015, AJ, 150 31, Figure 15) and to dither over the chip gap to ensure a minimum of 7 exposures covering the entire field.

## Proposal 15968 (STScI Edit Number: 0, Created: Tuesday, July 9, 2019 at 1:05:38 PM Eastern Standard Time) - Overview

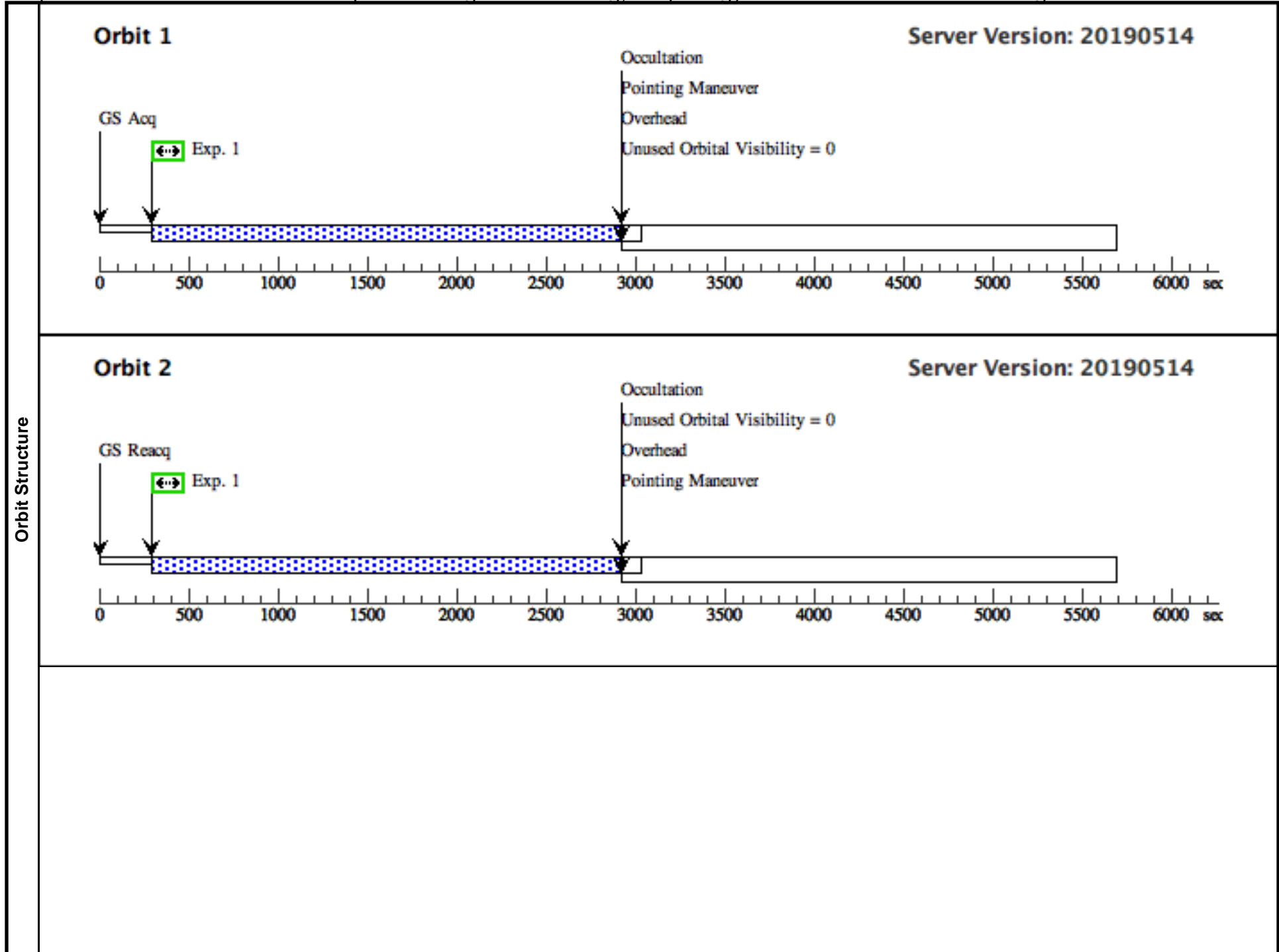
As discussed in our phase I, we require an orient that is  $\sim 0, 90,$  or  $180$  degrees from whatever orient the first visit executes at to maximize our overlap of the two visits, as non-overlap regions will not have enough exposures to fully clean the cosmic rays from orbit long exposures. Therefore, the second visit is set to within  $10$  degrees of a  $90$  degree rotation. Also as described in the Phase I, to maximise the scientific return of this data in combination with the MUSE and WFC3/IR data we wish to observe this target within 1 year of the completion of the WFC3/IR observations (PID: 15673) which is currently foreseen for September 2019.

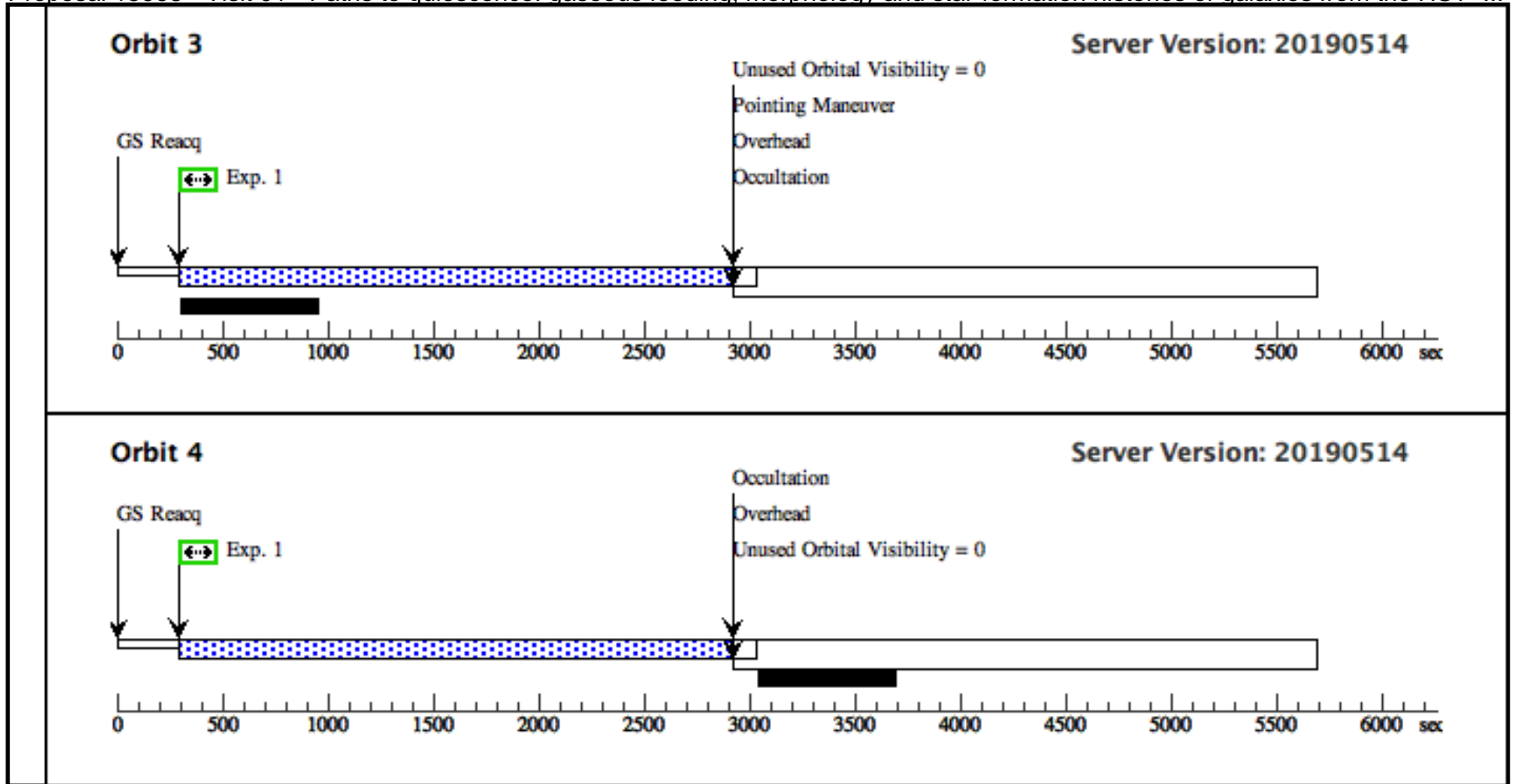
Our program is not significantly affected by the possibility of one gyro mode. If we were to go into one gyro mode, it may affect the schedulability of the second orientation. We could accept the same orient or  $180$  degree rotation instead of the  $90$  degree rotation we are currently using. Note: if we did switch orients, we would need to add an offset for the second visit to maximize the dither pattern usefulness.

Proposal 15968 - Visit 01 - Paths to quiescence: gaseous feeding, morphology and star-formation histories of galaxies from the HST+...

Tue Jul 09 18:05:38 GMT 2019

Visit	<b>Proposal 15968, Visit 01</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/UVIS Special Requirements: SCHED 100%; BEFORE 01-SEP-2020:00:00:00										
	Patterns	#	Primary Pattern				Secondary Pattern			Exposures	
		(1)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=3.287 Line Spacing=2.128	Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=false						(1)	
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(6)	MUDFQ2139-4434-UV	RA: 21 42 25.0175 (325.6042396d) Dec: -44 19 44.86 (-44.32913d) Equinox: J2000		Epoch of Position: 2000		V=16.64		Reference Frame: ICRS		
	<i>Comments:</i> Category=GALAXY Description=[HIGH REDSHIFT GALAXY, OSO]										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1		(6) MUDFQ2139-4434-UV	WFC3/UVIS, ACCUM, UVIS-CENTER	F336W	FLASH=4		Pattern 1, Exps 1-1 in Visit 01 (1)	2588 Secs (10445 Secs)		
									[=>(Pattern 1)]		[1]
									[=>2619.0 Secs (Pattern 2)]		[2]
									[=>2619.0 Secs (Pattern 3)]		[3]
								[=>2619.0 Secs (Pattern 4)]		[4]	





Proposal 15968 - Visit 02 - Paths to quiescence: gaseous feeding, morphology and star-formation histories of galaxies from the HST+...

Tue Jul 09 18:05:38 GMT 2019

Visit	<b>Proposal 15968, Visit 02</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: WFC3/UVIS Special Requirements: SCHED 100%; ORIENT 85D TO 95D FROM 01; BEFORE 01-SEP-2020:00:00:00										
	Patterns	#	Primary Pattern				Secondary Pattern			Exposures	
		(1)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=3.287 Line Spacing=2.128	Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=false							(1)
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(6)	MUDFQ2139-4434-UV	RA: 21 42 25.0175 (325.6042396d) Dec: -44 19 44.86 (-44.32913d) Equinox: J2000		Epoch of Position: 2000		V=16.64			Reference Frame: ICRS	
	<i>Comments:</i> Category=GALAXY Description=[HIGH REDSHIFT GALAXY, OSO]										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1		(6) MUDFQ2139-4434-UV	WFC3/UVIS, ACCUM, UVIS-CENTER	F336W	FLASH=4		Pattern 1, Exps 1-1 in Visit 02 (1)	2588 Secs (10445 Secs)		
									[=>(Pattern 1)]		[1]
									[=>2619.0 Secs (Pattern 2)]		[2]
									[=>2619.0 Secs (Pattern 3)]		[3]
								[=>2619.0 Secs (Pattern 4)]		[4]	

