



16890 - Ultra-Diffuse Galaxy Formation in Groups -- Tidal or Born That Way?

Cycle: 29, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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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	(1) KUG203-DW1 ANY	ACS/WFC WFC3/UVIS	2	07-Dec-2021 10:00:18.0	yes
02	(3) KDG013 ANY	ACS/WFC WFC3/UVIS	2	07-Dec-2021 10:00:20.0	yes
03	(2) UGC9050-DW1 ANY	ACS/WFC WFC3/UVIS	2	07-Dec-2021 10:00:21.0	yes

6 Total Orbits Used

ABSTRACT

We request D-configuration HI observations as well as HST data to image three ultra-diffuse galaxies (UDGs) which are in a group environment and plausibly influenced by tidal forces. These dwarfs provide evidence that UDGs can form through interactions, although it is not clear whether they are normal dwarf galaxies that have been 'puffed up' during an interaction or if they are tidal dwarf galaxies, the dark matter-free stellar aggregations that can result from gas-rich major galaxy encounters. Alternatively, these galaxies may have formed as UDGs through some other mechanism, and are now associated with a larger galaxy halo. The deep VLA observations are essential for pinpointing HI emission associated with each dwarf and any tidal material. The HST observations will allow for a detailed morphological analysis of each interacting dwarf and will measure their globular cluster content -- a powerful discriminant between formation scenarios. Our team has recently demonstrated the use of combined VLA HI and HST observations in two UDGs, showing that they likely formed via tidal heating of normal dwarf galaxies. This proposal will more than double the sample of objects studied in this way, with a focus on systems that show some evidence for recent star formation.

OBSERVING DESCRIPTION

The observations are going to be performed with the ACS/WFC (primary) and WFC3/UVIS (parallel). We request imaging in F555W and F814W filters for both instruments in order to both measure the detailed morphology of each ultra-diffuse dwarf and their globular cluster (GC) content. The parallel WFC3 pointings will allow us to observe a field region next to our ultra-diffuse galaxy targets and will be invaluable to characterize the 'background' of point sources with consistent magnitudes and colors as the GCs we wish to identify.

We require one orbit per filter, so two orbits for each of our three dwarf targets (six orbits total). Each visit will be two orbits. For two targets (KDG013 and KUG203Dw1), we use a standard four-point dither box for each orbit, with sub-pixel dithers in order to get closer to the native resolution of ACS. The dwarf target will be placed on the WFC1 aperture, as they both fit easily on a single chip. The third target is larger, and so we place it at the WFC aperture, and employ a 3-point dither pattern to cover the ACS chip gap with cosmic ray rejection. No ORIENTS for any of our targets are necessary.

This program is relatively resilient to two-gyro mode as we have no ORIENT constraints and could switch to single orbit visits if necessary. Nor does this program have time constraints (other than the baseline excitement of the science!). We can also achieve our science goals with a longer acquisition time, if necessary.

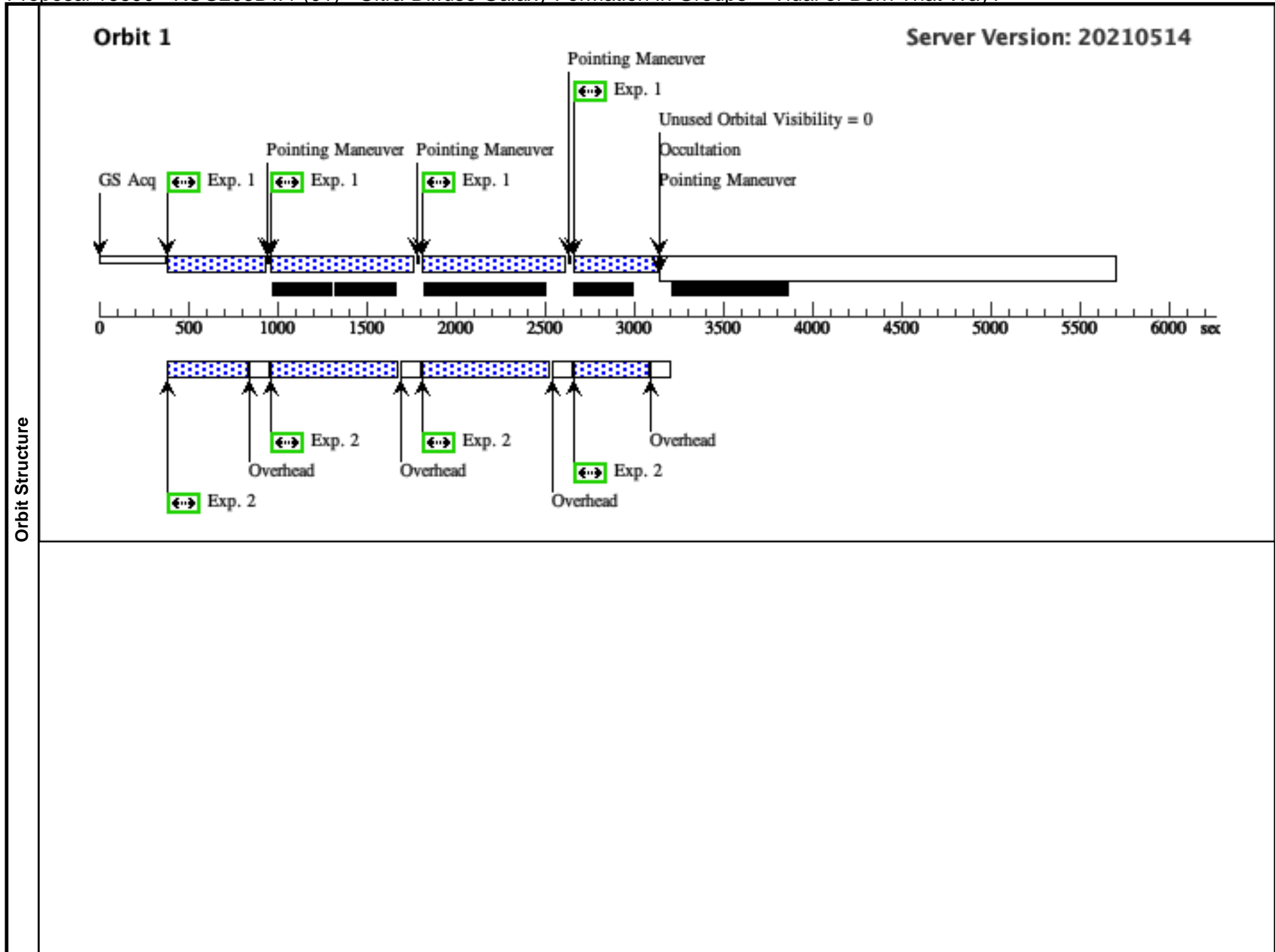
Note that this dataset was requested through the joint NRAO program. We will also be acquiring VLA HI observations of the three ultradiffuse galaxy targets in this proposal to get a more complete picture and narrow down the formation scenarios of these remarkable galaxies. We do not

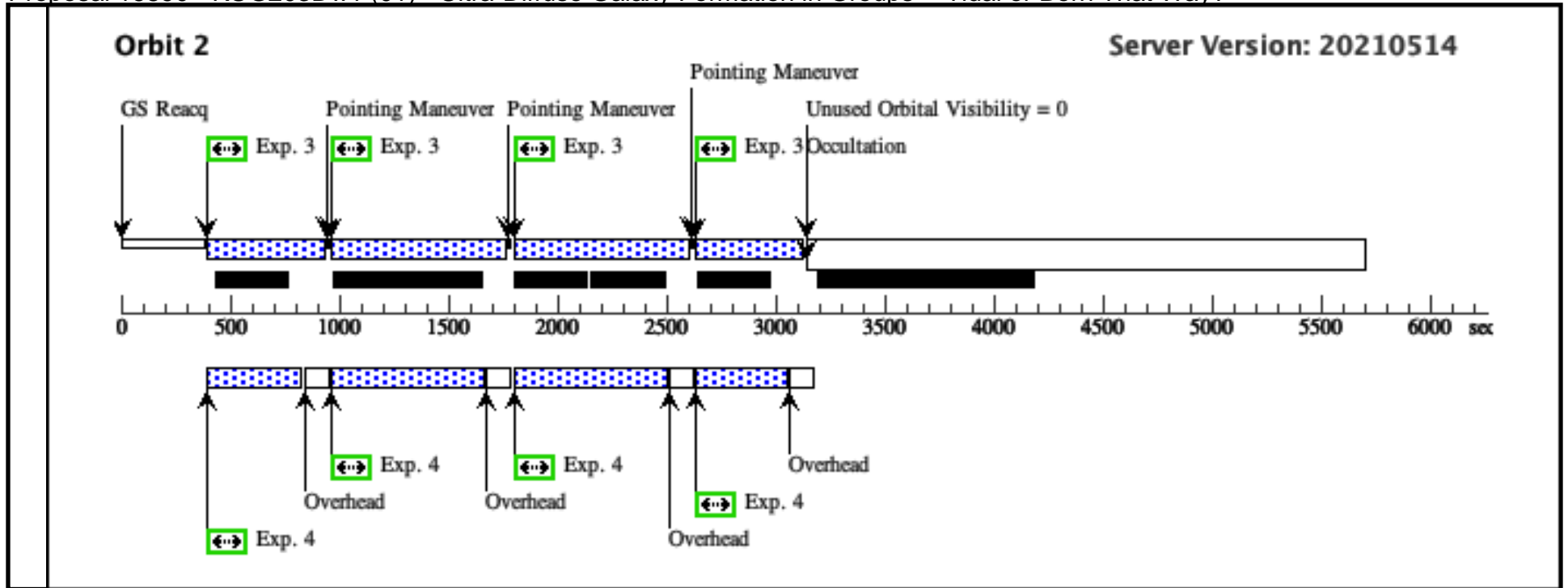
Proposal 16890 (STScI Edit Number: 0, Created: Tuesday, December 7, 2021 at 10:00:22 AM Eastern Standard Time) - Overview
require concurrent VLA and HST imaging.

Proposal 16890 - KUG203Dw1 (01) - Ultra-Diffuse Galaxy Formation in Groups -- Tidal or Born That Way?

Tue Dec 07 15:00:22 GMT 2021

Visit	Proposal 16890, KUG203Dw1 (01) Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS, ACS/WFC Special Requirements: (none)									
	(Parallel Exposure 2 (Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in KUG203Dw1 (01))) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser									
Diagnosics										
Patterns	#	Primary Pattern	Secondary Pattern	Exposures						
	(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.262 Line Spacing=0.192	Coordinate Frame=POS-TARG Pattern Orientation=18.39 Angle Between Sides=68.14 Center Pattern=false		(1-2), (3-4)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	KUG203-DW1	RA: 02 05 47.0000 (31.4458333d) Dec: -09 50 31.00 (-9.84194d) Equinox: J2000		V=20.0	Reference Frame: ICRS				
<i>Comments:</i> Category=GALAXY Description=[DWARF SPHEROIDAL]										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(1) KUG203-DW1	ACS/WFC, ACCUM, WFC1	F555W			Pattern 1, Exps 1-2 in KUG203Dw1 (01) (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in KUG203Dw1 (01)	600 Secs (2046 Secs) [==>340.0 Secs (Pattern 1)] [==>680.0 Secs (Pattern 2)] [==>680.0 Secs (Pattern 3)] [==>346.0 Secs (Pattern 4)]	[1]
	2	ANY		WFC3/UVIS, ACCUM, UVIS1	F555W	FLASH=4.0		Pattern 1, Exps 1-2 in KUG203Dw1 (01) (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in KUG203Dw1 (01)	355 Secs (2275 Secs) [==>420.0 Secs (Pattern 1)] [==>715.0 Secs (Pattern 2)] [==>715.0 Secs (Pattern 3)] [==>425.0 Secs (Pattern 4)]	[1]
	3		(1) KUG203-DW1	ACS/WFC, ACCUM, WFC1	F814W			Pattern 1, Exps 3-4 in KUG203Dw1 (01) (1) Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in KUG203Dw1 (01)	600 Secs (2098 Secs) [==>375.0 Secs (Pattern 1)] [==>677.0 Secs (Pattern 2)] [==>676.0 Secs (Pattern 3)] [==>370.0 Secs (Pattern 4)]	[2]
	4	ANY		WFC3/UVIS, ACCUM, UVIS1	F814W	FLASH=8.0		Pattern 1, Exps 3-4 in KUG203Dw1 (01) (1) Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in KUG203Dw1 (01)	369 Secs (2245 Secs) [==>420.0 Secs (Pattern 1)] [==>703.0 Secs (Pattern 2)] [==>702.0 Secs (Pattern 3)] [==>420.0 Secs (Pattern 4)]	[2]

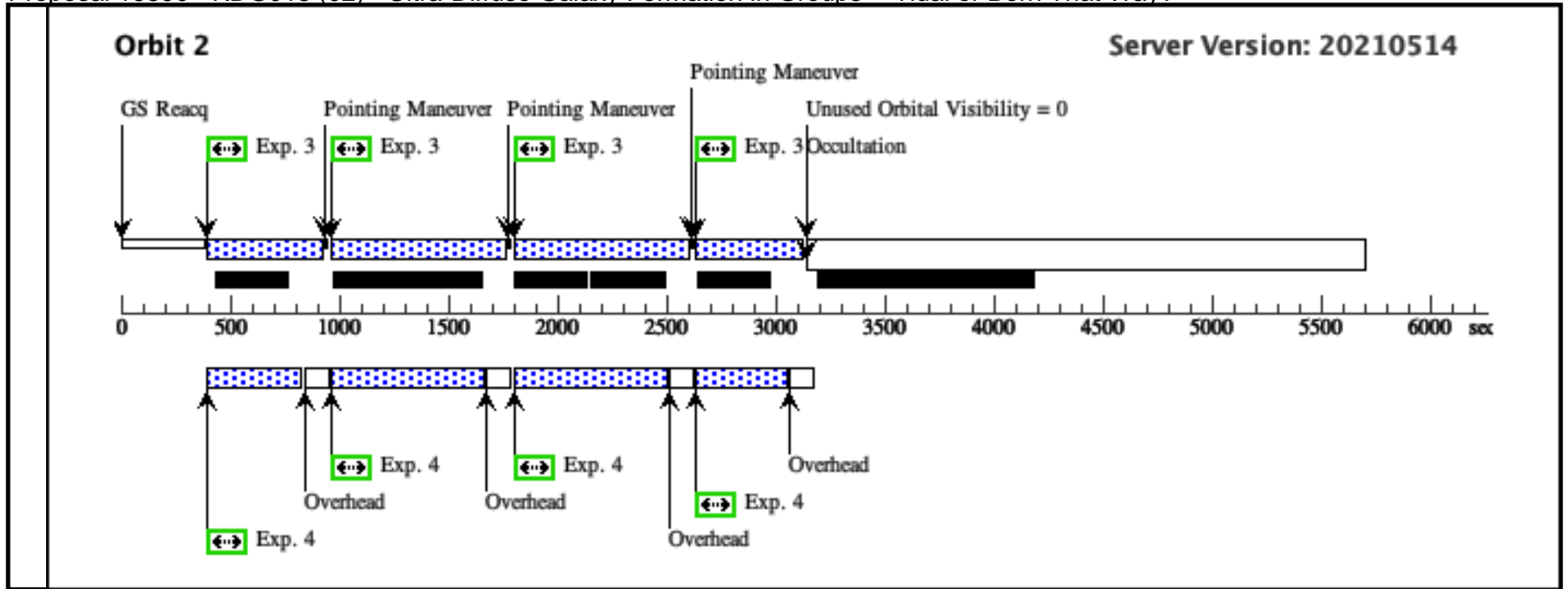




Proposal 16890 - KDG013 (02) - Ultra-Diffuse Galaxy Formation in Groups -- Tidal or Born That Way?

Tue Dec 07 15:00:22 GMT 2021

Visit	Proposal 16890, KDG013 (02) Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS, ACS/WFC Special Requirements: (none)									
	(Parallel Exposure 2 (Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in KDG013 (02))) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser									
Diagnosics										
Patterns	#	Primary Pattern	Secondary Pattern	Exposures						
	(1)	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.262 Line Spacing=0.192	Coordinate Frame=POS-TARG Pattern Orientation=18.39 Angle Between Sides=68.14 Center Pattern=false		(1-2), (3-4)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(3)	KDG013	RA: 02 08 33.0000 (32.1375000d) Dec: -07 50 59.00 (-7.84972d) Equinox: J2000		V=20.0	Reference Frame: ICRS				
<i>Comments:</i> Category=GALAXY Description=[DWARF SPHEROIDAL]										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(3) KDG013	ACS/WFC, ACCUM, WFC1	F555W			Pattern 1, Exps 1-2 in KDG013 (02) (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in KDG013 (02)	600 Secs (2046 Secs) [==>340.0 Secs (Pattern 1)] [==>680.0 Secs (Pattern 2)] [==>680.0 Secs (Pattern 3)] [==>346.0 Secs (Pattern 4)]	[1]
	2		ANY	WFC3/UVIS, ACCUM, UVIS1	F555W	FLASH=4.0		Pattern 1, Exps 1-2 in KDG013 (02) (1) Prime + Parallel Group 1-2 in Pattern 1, Exps 1-2 in KDG013 (02)	355 Secs (2275 Secs) [==>420.0 Secs (Pattern 1)] [==>715.0 Secs (Pattern 2)] [==>715.0 Secs (Pattern 3)] [==>425.0 Secs (Pattern 4)]	[1]
	3		(3) KDG013	ACS/WFC, ACCUM, WFC1	F814W			Pattern 1, Exps 3-4 in KDG013 (02) (1) Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in KDG013 (02)	600 Secs (2089 Secs) [==>365.0 Secs (Pattern 1)] [==>677.0 Secs (Pattern 2)] [==>676.0 Secs (Pattern 3)] [==>371.0 Secs (Pattern 4)]	[2]
	4		ANY	WFC3/UVIS, ACCUM, UVIS1	F814W	FLASH=8.0		Pattern 1, Exps 3-4 in KDG013 (02) (1) Prime + Parallel Group 3-4 in Pattern 1, Exps 3-4 in KDG013 (02)	369 Secs (2245 Secs) [==>420.0 Secs (Pattern 1)] [==>703.0 Secs (Pattern 2)] [==>702.0 Secs (Pattern 3)] [==>420.0 Secs (Pattern 4)]	[2]



Proposal 16890 - UGC9050Dw1 (03) - Ultra-Diffuse Galaxy Formation in Groups -- Tidal or Born That Way?

Tue Dec 07 15:00:22 GMT 2021

Visit	Proposal 16890, UGC9050Dw1 (03) Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS, 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=3.034 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.29 Angle Between Sides= Center Pattern=false		(1-2), (3-4)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(2)	UGC9050-DW1	RA: 14 09 13.0000 (212.3041667d) Dec: +51 13 28.00 (51.22444d) Equinox: J2000		V=20.0	Reference Frame: ICRS				
	<i>Comments:</i> Category=GALAXY Description=[DWARF SPHEROIDAL]									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1		(2) UGC9050-DW1	ACS/WFC, ACCUM, WFC	F555W			Pattern 2, Exps 1-2 in UGC9050Dw1 (03) (2) Prime + Parallel Group 1-2 in Pattern 2, Exps 1-2 in UGC9050Dw1 (03)	802 Secs (2406 Secs) [==>(Pattern 1)] [==>(Pattern 2)] [==>(Pattern 3)]	[1]
	2		ANY	WFC3/UVIS, ACCUM, UVIS1	F555W	FLASH=1.0		Pattern 2, Exps 1-2 in UGC9050Dw1 (03) (2) Prime + Parallel Group 1-2 in Pattern 2, Exps 1-2 in UGC9050Dw1 (03)	750 Secs (2474 Secs) [==>858.0 Secs (Pattern 1)] [==>808.0 Secs (Pattern 2)] [==>808.0 Secs (Pattern 3)]	[1]
	3		(2) UGC9050-DW1	ACS/WFC, ACCUM, WFC	F814W			Pattern 2, Exps 3-4 in UGC9050Dw1 (03) (2) Prime + Parallel Group 3-4 in Pattern 2, Exps 3-4 in UGC9050Dw1 (03)	800 Secs (2439 Secs) [==>813.0 Secs (Pattern 1)] [==>813.0 Secs (Pattern 2)] [==>813.0 Secs (Pattern 3)]	[2]
	4		ANY	WFC3/UVIS, ACCUM, UVIS1	F814W	FLASH=1.0		Pattern 2, Exps 3-4 in UGC9050Dw1 (03) (2) Prime + Parallel Group 3-4 in Pattern 2, Exps 3-4 in UGC9050Dw1 (03)	750 Secs (2473 Secs) [==>839.0 Secs (Pattern 1)] [==>817.0 Secs (Pattern 2)] [==>817.0 Secs (Pattern 3)]	[2]

