



17131 - DDO68 C: the actual appearance of a ghost satellite dwarf

Cycle: 30, 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) DDO68-C	ACS/WFC	3	18-Oct-2022 10:02:23.0	yes
02	(1) DDO68-C	ACS/WFC	3	18-Oct-2022 10:02:25.0	yes

6 Total Orbits Used

ABSTRACT

Extremely metal-poor galaxies (XMPs) in the local Universe are of fundamental interest since they provide a window on conditions similar to those of primordial galaxies. An iconic example of a nearby XMP is the gas-rich dwarf DDO68, at ~ 13 Mpc distance, with a metallicity of $\sim 3\%$ solar, discrepantly low compared with its relatively large stellar mass of $10^8 M_{\odot}$. What makes DDO68 even more exceptional is the presence of two confirmed interacting satellites and a third candidate, dubbed DDO68-C, with a systemic HI velocity similar to that of DDO68, but with no confirmed distance. Indeed this "ghost" satellite has been poorly studied so far because of the presence of a bright foreground star close to its line of sight, thus very little is known about its stellar mass and stellar population.

We propose to image DDO68-C for the first time with ACS/WFC in F606W (V) and F814W (I) to resolve its individual stars and derive its distance through the tip of the red giant branch. With a new robust distance for DDO68-C, the ACS data will allow us to also infer its star formation history, stellar mass, and constrain its metallicity through comparison of the empirical (V,I) color-magnitude diagrams with synthetic ones. These results will serve as input to N-body hydrodynamical simulations aimed at reconstructing the merging history of DDO68 with its satellites, and at possibly explaining its extremely low metal content. If DDO68-C turns out to be at the same distance as DDO68, this system would be a unique case of a dwarf interacting with three satellites, challenging the predictions from cosmological models for the satellite population around galaxies with the mass of DDO68.

OBSERVING DESCRIPTION

We will observe the faint galaxy DDO68C with the ACS WFC for ~ 3.5 orbits in F606W and ~ 2.5 orbits in F814W, for a total of 6 orbits. DDO68C is located very close to a bright foreground star, thus much attention is paid to avoid this contaminant while sampling at the same time a large enough portion of the galaxy.

We organize our observations in 2 separate visits.

- Vis01. This will last for 3 orbits during which we will observe the target in F606W. We choose a primary 3 point dither line pattern coupled with a 4 point dither box. For the primary dither, we adopt large $8''$ offsets running parallel to the gap. This is because we need artifacts from the bright foreground star to fall in different regions of the ACS detector in order to remove them during data reduction. The secondary dither will instead improve PSF sampling.

We request an orient in the range 265-275 to avoid the bright foreground star.

Proposal 17131 (STScI Edit Number: 0, Created: Tuesday, October 18, 2022 at 9:02:26 AM Eastern Standard Time) - Overview

- Vis02. This will last for 3 orbits during which we will observe the target in F814W for 2.5 orbits and in F606W for 0.5 orbits. For the F814W observations, the dither is the same as in visit 1. The F606W exposures are instead acquired according to a 3 point line dither pattern as the primary one (but no secondary dither pattern is adopted).

We request the same orient as in Visit 01.

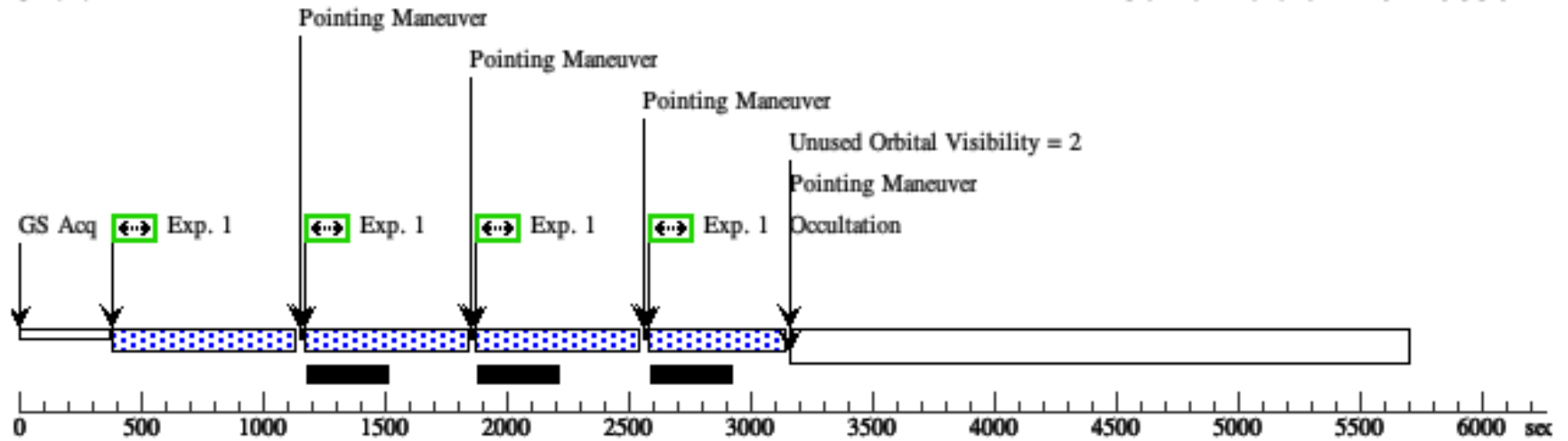
Due to the stringent scheduling constraints needed to execute this program, any reduction of the visibility windows from a reduced gyro operations would highly affect the possibility of completing this project.

Proposal 17131 - DDO68C vis01 V (01) - DDO68 C: the actual appearance of a ghost satellite dwarf

Visit	Proposal 17131, DDO68C_vis01_V (01), implementation										Tue Oct 18 14:02:26 GMT 2022	
	Diagnostic Status: No Diagnostics											
	Scientific Instruments: ACS/WFC											
	Special Requirements: ORIENT 265D TO 275 D											
Patterns	#	Primary Pattern				Secondary Pattern				Exposures		
	(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=8 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=0 Angle Between Sides= Center Pattern=false	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.2637 Line Spacing=0.1856	Coordinate Frame=POS-TARG Pattern Orientation=20.7 Angle Between Sides=69.02 Center Pattern=false	(1)						
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections		Fluxes		Miscellaneous				
	(1)	DDO68-C	RA: 09 56 32.6024 (149.1358433d) Dec: +29 00 30.81 (29.00856d) Equinox: J2000			V=16		Reference Frame: ICRS				
	Comments: Category=GALAXY Description=[AMORPHOUS IRREGULAR]											
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit	
	1		(1) DDO68-C	ACS/WFC, ACCUM, WFC	F606W			Pattern 1, Exps 1-1 in DDO68C_vis01_V (01) (1)	550 Secs (6406 Secs)			
								[==>549.0 Secs (Pattern 1,1)] [==>549.0 Secs (Pattern 1,2)] [==>549.0 Secs (Pattern 1,3)] [==>439.0 Secs (Pattern 1,4)]		[1]		
								[==>(Pattern 2,1)] [==>(Pattern 2,2)] [==>(Pattern 2,3)] [==>510.0 Secs (Pattern 2,4)]		[2]		
								[==>(Pattern 3,1)] [==>(Pattern 3,2)] [==>(Pattern 3,3)] [==>510.0 Secs (Pattern 3,4)]		[3]		

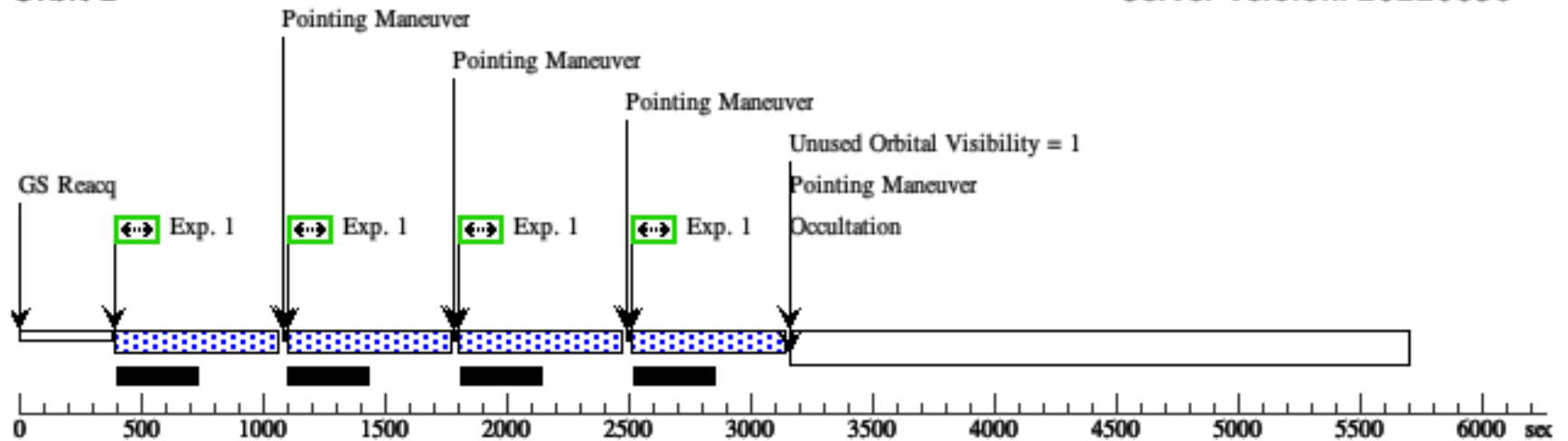
Orbit 1

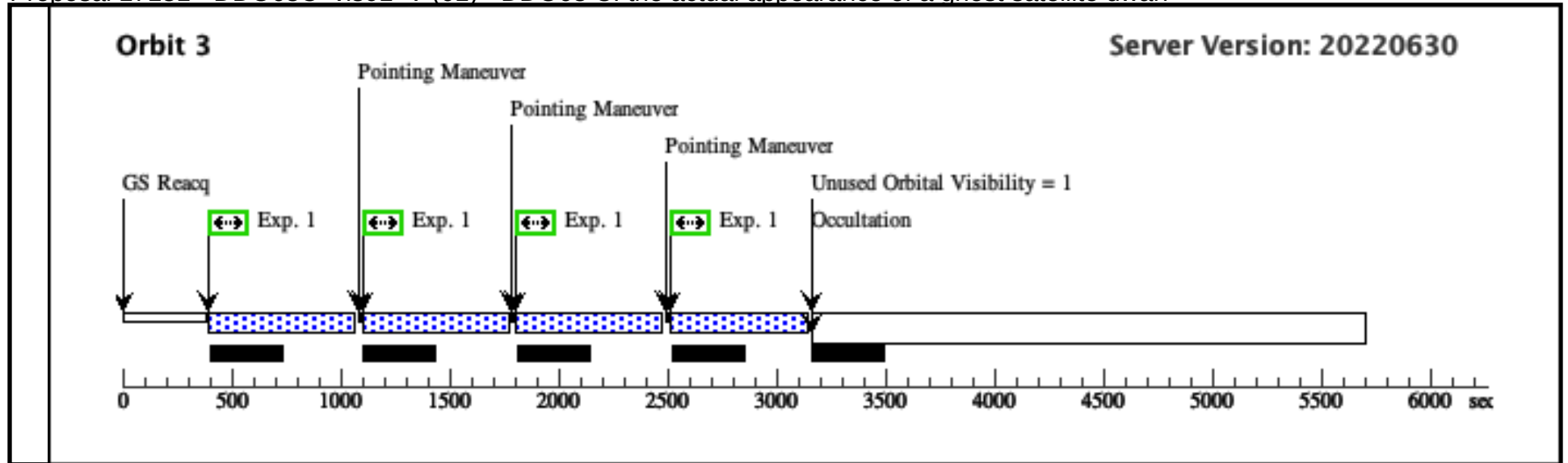
Server Version: 20220630



Orbit 2

Server Version: 20220630



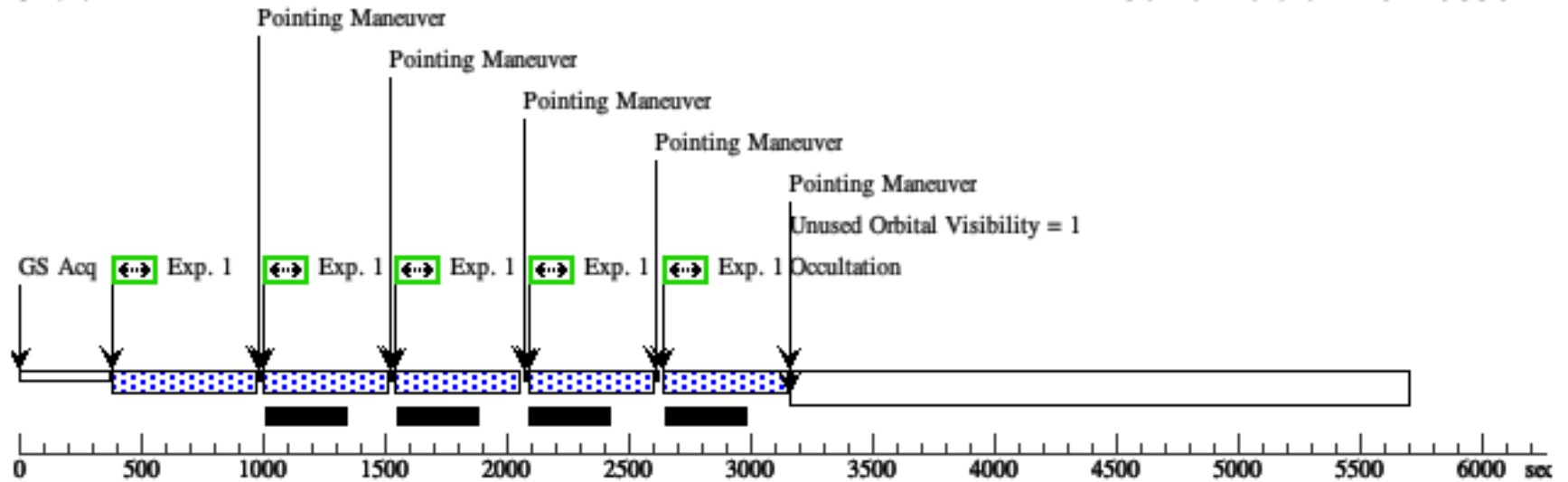


Proposal 17131 - DDO68C vis02 I (02) - DDO68 C: the actual appearance of a ghost satellite dwarf

Visit	Proposal 17131, DDO68C_vis02_I (02), implementation										Tue Oct 18 14:02:26 GMT 2022	
	Diagnostic Status: No Diagnostics											
	Scientific Instruments: ACS/WFC											
	Special Requirements: SAME ORIENT AS 01											
Patterns	#	Primary Pattern				Secondary Pattern				Exposures		
	(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=8 Line Spacing=		Coordinate Frame=POS-TARG Pattern Orientation=0 Angle Between Sides= Center Pattern=false		Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.2637 Line Spacing=0.1856		Coordinate Frame=POS-TARG Pattern Orientation=20.7 Angle Between Sides=69.02 Center Pattern=false		(1)		
	(2)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=8 Line Spacing=		Coordinate Frame=POS-TARG Pattern Orientation=0 Angle Between Sides= Center Pattern=false						(2)		
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous			
	(1)	DDO68-C	RA: 09 56 32.6024 (149.1358433d) Dec: +29 00 30.81 (29.00856d) Equinox: J2000				V=16		Reference Frame: ICRS			
Comments: Category=GALAXY Description=[AMORPHOUS IRREGULAR]												
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit	
	1		(1) DDO68-C	ACS/WFC, ACCUM, WFC	F814W			Pattern 1, Exps 1-1 in DDO68C_vis02_I (02) (1)	350 Secs (4676 Secs)			
									[==>384.0 Secs (Pattern 1,1)]		[1]	
									[==>384.0 Secs (Pattern 1,2)]			
									[==>384.0 Secs (Pattern 1,3)]			
									[==>384.0 Secs (Pattern 1,4)]			
									[==>384.0 Secs (Pattern 2,1)]		[2]	
									[==>398.0 Secs (Pattern 2,2)]			
									[==>398.0 Secs (Pattern 2,3)]			
									[==>398.0 Secs (Pattern 2,4)]			
								[==>398.0 Secs (Pattern 3,1)]		[3]		
								[==>398.0 Secs (Pattern 3,2)]				
								[==>383.0 Secs (Pattern 3,3)]				
								[==>383.0 Secs (Pattern 3,4)]				
	2		(1) DDO68-C	ACS/WFC, ACCUM, WFC	F606W			Pattern 2, Exps 2-2 in DDO68C_vis02_I (02) (2)	350 Secs (1149 Secs)			
									[==>383.0 Secs (Pattern 1)]		[3]	
									[==>383.0 Secs (Pattern 2)]			
									[==>383.0 Secs (Pattern 3)]			

Orbit 1

Server Version: 20220630



Orbit 2

Server Version: 20220630

