15850 - An accurate age for the enigmatic galaxy NGC1052-DF2

Cycle: 27, Proposal Category: GO

(UV Initiative)

(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) NGC1052-DF2	WFC3/UVIS	3	29-Jul-2019 09:00:49.0	yes

3 Total Orbits Used

ABSTRACT

The galaxy NGC1052-DF2 has been the subject of intense debate in the literature. Not only does it seem to have a very low dark matter content, it also has a peculiar population of very bright globular clusters that make up 3% of the total light. A central question is when the galaxy and its unusual globular clusters were formed. The best constraints have come from optical spectroscopy of the bright globular clusters. The clusters have a metallicity of [Fe/H]=-1.4 and an apparent age of 9 Gyr, consistent with constraints on the metallicity and age of the diffuse light. However, these age

measurements are only lower limits, due to the unknown contribution of blue horizontal branch (BHB) stars to the integrated light. If the BHB branch is as strong as in Milky Way globular clusters of the same metallicity, the true age of the globular clusters, and the galaxy, could be 13 Gyr - predating the formation of the massive elliptical galaxy NGC1052. The objective of this proposal is to measure the contribution of hot stars to the integrated light by obtaining F225W UV imaging of NGC1052-DF2 and its globular clusters with UVIS. The F225W-F814W color is sensitive to hot stars and breaks the degeneracy between age and the strength of the BHB. This measurement will pin down the formation epoch of the galaxy, currently only constrained to be at least ~9 Gyr ago; determine whether the globular clusters all have identical UV properties or show variation in their F225W-F814W colors like luminous Milky Way clusters; and test the hypothesis that a significant fraction of the diffuse light comes from disrupted globular clusters.

OBSERVING DESCRIPTION

This program aims to obtain 3 orbits of UV F225W imaging of the galaxy NGC1052-DF2 and its globular clusters.

The 3 orbits are organized in a single visit. Within each orbit two exposures are obtained, with an exposure time of ~1350 seconds per exposure and a standard chip gap dither between the two exposures. A 10 electron post flash is used to mitigate CTE effects. Large POS_TARGs (of ~25") are used in between each orbit (so before the first exposure, before the third, and before the fifth) to obtain reliable photometry of the diffuse light.

There are no timing or orientation constraints.

Visit

Proposal 15850, Visit 01, implementation Mon Jul 29 13:00:50 GMT 2019

Diagnostic Status: No Diagnostics

Scientific Instruments: WFC3/UVIS

Special Requirements: (none)

Patterns

#	Primary Pattern		Secondary Pattern	Exposures
(1)	Pattern Type=WFC3-UVIS-GAP-LINE	Coordinate Frame=POS-TARG		(1), (2), (3)
	Purpose=MOSAIC	Pattern Orientation=85.759		
	Number Of Points=2	Angle Between Sides=		
	Point Spacing=2.414	Center Pattern=false		
	Line Spacing=			

Fixed Targets

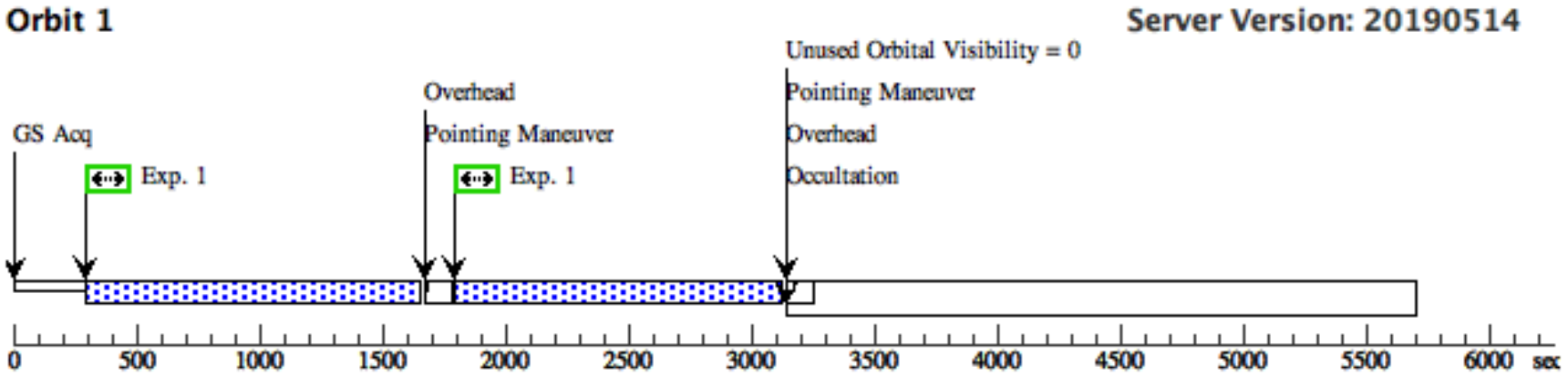
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	NGC1052-DF2	RA: 02 41 46.7200 (40.4446667d) Dec: -08 24 10.80 (-8.40300d) Equinox: J2000		V=21 expected F225W of clusters = 26 -26.5	Reference Frame: ICRS

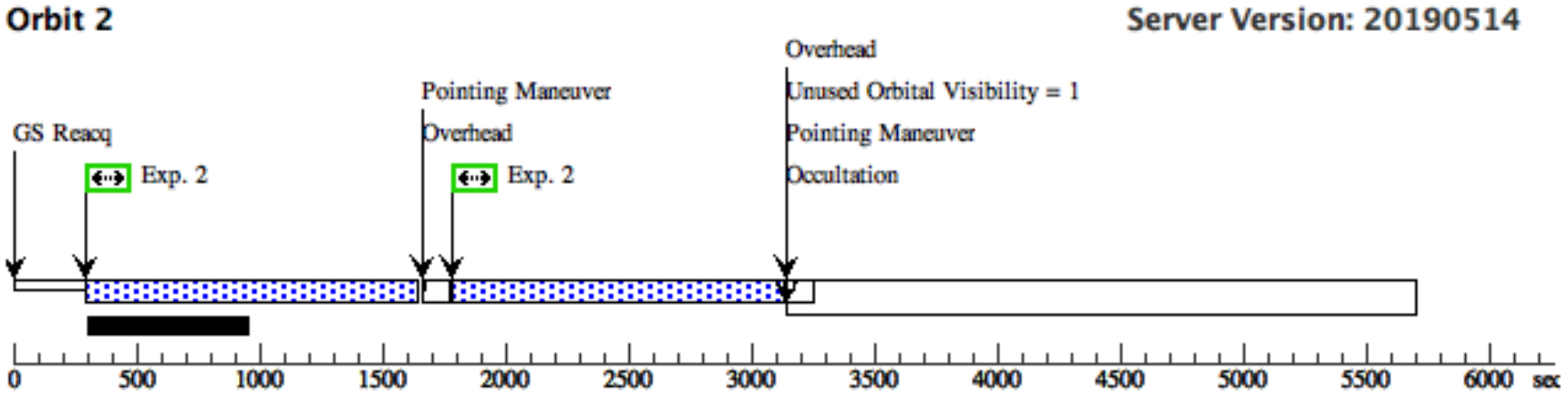
Comments:
Category=GALAXY
Description=[DWARF SPHEROIDAL]

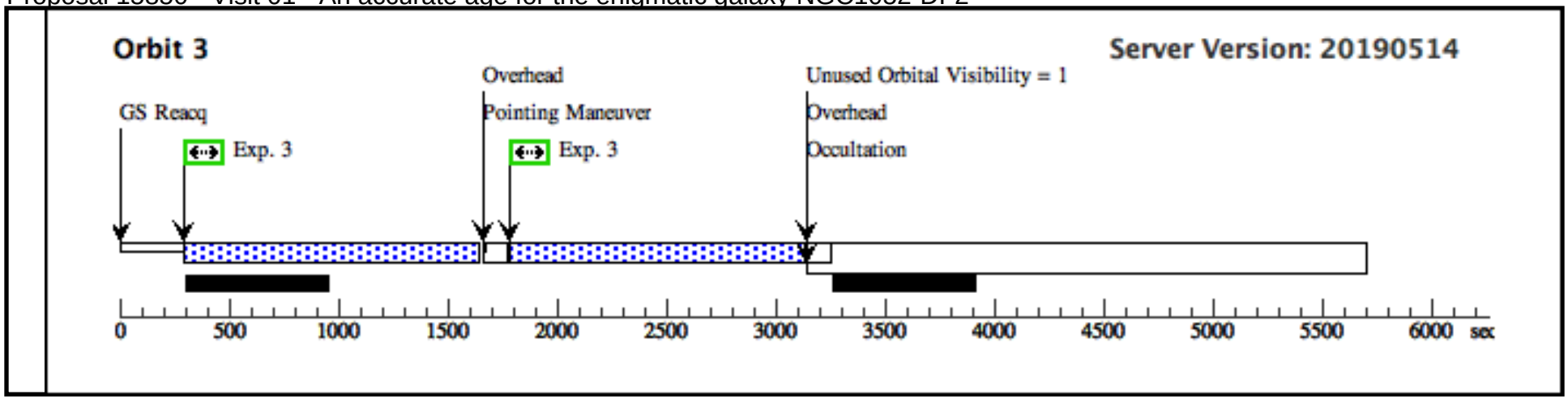
Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
1		(1) NGC1052-DF2	WFC3/UVIS, ACCUM, UVIS-CENTER	F225W	FLASH=10.0	POS TARG -25,30; GS ACQ SCENARIO BASE1B3	Pattern 1, Exps 1-1 in Visit 01 (1)	1000 Secs (2670 Secs) *[==>1335.0 Secs (Pattern 1)]* *[==>1335.0 Secs (Pattern 2)]*	***[1]***
2		(1) NGC1052-DF2	WFC3/UVIS, ACCUM, UVIS-CENTER	F225W	FLASH=10.0	POS TARG 20,15	Pattern 1, Exps 2-2 in Visit 01 (1)	1000 Secs (2700 Secs) *[==>1350.0 Secs (Pattern 1)]* *[==>1350.0 Secs (Pattern 2)]*	***[2]***
3		(1) NGC1052-DF2	WFC3/UVIS, ACCUM, UVIS-CENTER	F225W	FLASH=10.0	POS TARG -10,-25	Pattern 1, Exps 3-3 in Visit 01 (1)	1000 Secs (2700 Secs) *[==>1350.0 Secs (Pattern 1)]* *[==>1350.0 Secs (Pattern 2)]*	***[3]***

Orbit Structure






Orbit 3
Server Version: 20190514
GS Reacq
Exp. 3
Overhead
Pointing Maneuver
Exp. 3
Unused Orbital Visibility = 1
Overhead
Occultation
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2500
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3500
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5500
6000
sec