



16664 - A repeating fast radio burst in a globular cluster at 3.6 Mpc

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) M81-GC	WFC3/UVIS	2	01-Dec-2022 16:00:19.0	yes
51	(1) M81-GC	WFC3/UVIS	2	01-Dec-2022 16:00:20.0	yes
52	(1) M81-GC	WFC3/UVIS	1	01-Dec-2022 16:00:21.0	yes

5 Total Orbits Used

ABSTRACT

The repeating fast radio burst (FRB) 20200120E has been localized with 100 mas precision using the European VLBI network to a globular cluster (GC) in the halo of M81, a spiral galaxy at a distance of 3.63 Mpc. The proximity of the source lends itself to detailed analysis of the FRB's environment as in the case of FRB 180916 (at a distance of 150 Mpc). GCs are known to be a hotbed of stellar interaction as proven by the presence of large populations of millisecond pulsars, low mass X-ray binaries and cataclysmic variables. However, the presence of FRB 20201020E in an low metallicity, old stellar population GC is surprising compared to the locations of most other FRBs near star forming regions and the theoretical expectations of FRBs originating from extremely active neutron stars that are typically found in such star forming regions. We request a short WFC3/UVIS observation of the GC to measure its stellar density profile, compactness, dynamic state (i.e. whether it has undergone core-collapse) and perform precise astrometry with respect to the radio reference frame to localize the FRB within the GC.

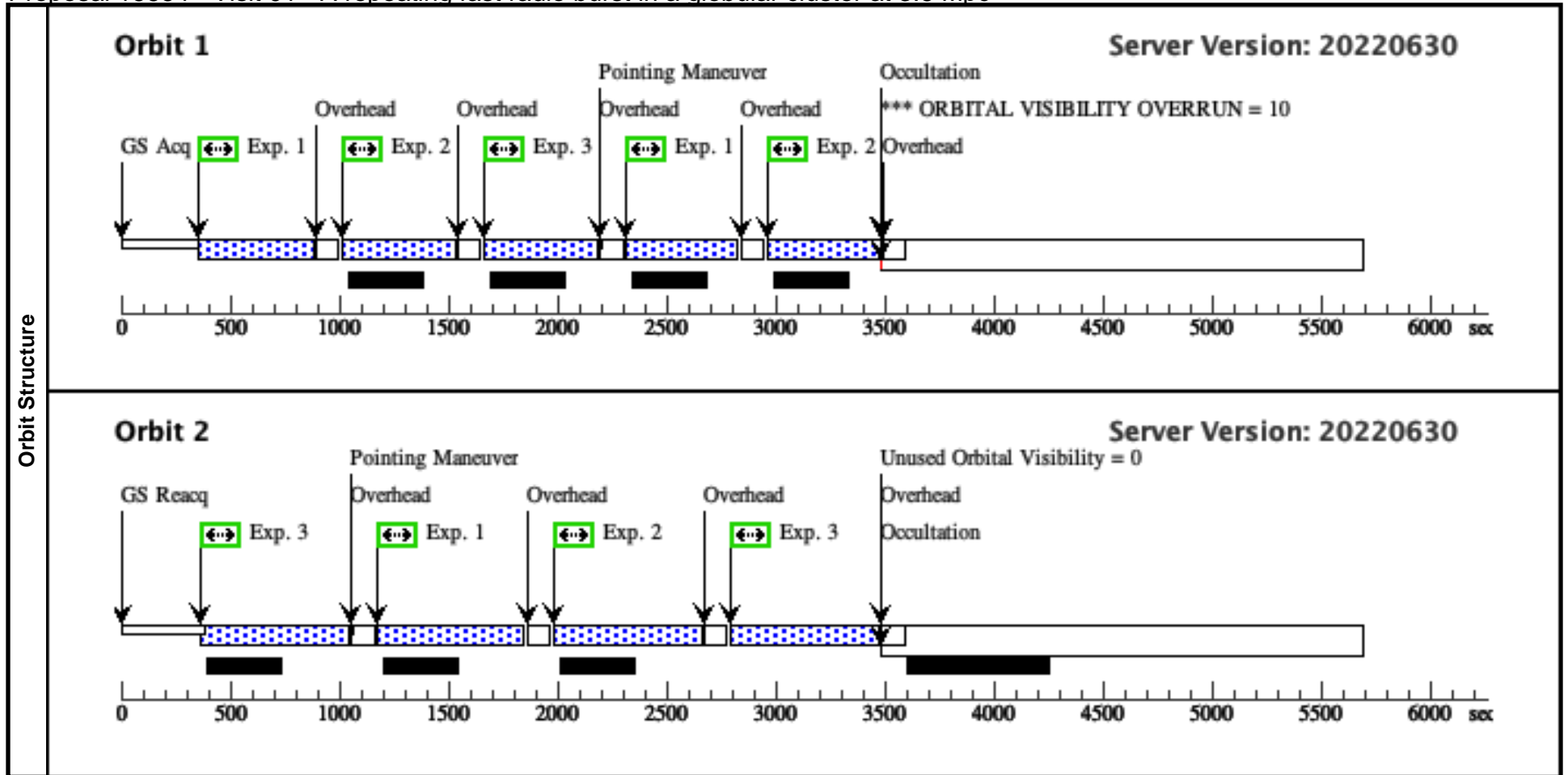
OBSERVING DESCRIPTION

We propose to observe the globular cluster [PR95] 30244 in the M81 system with HST to measure its size, position, radial profile, and stellar population. This will allow us to better understand the nature of the repeating FRB 20200120E. Here we have requested observations in F438W, F606W, and F814W filters using the WFSC3/UVIS camera with a 3-point dithering for adequately sampling the PSF.

Proposal 16664 - Visit 01 - A repeating fast radio burst in a globular cluster at 3.6 Mpc

Thu Dec 01 21:00:22 GMT 2022

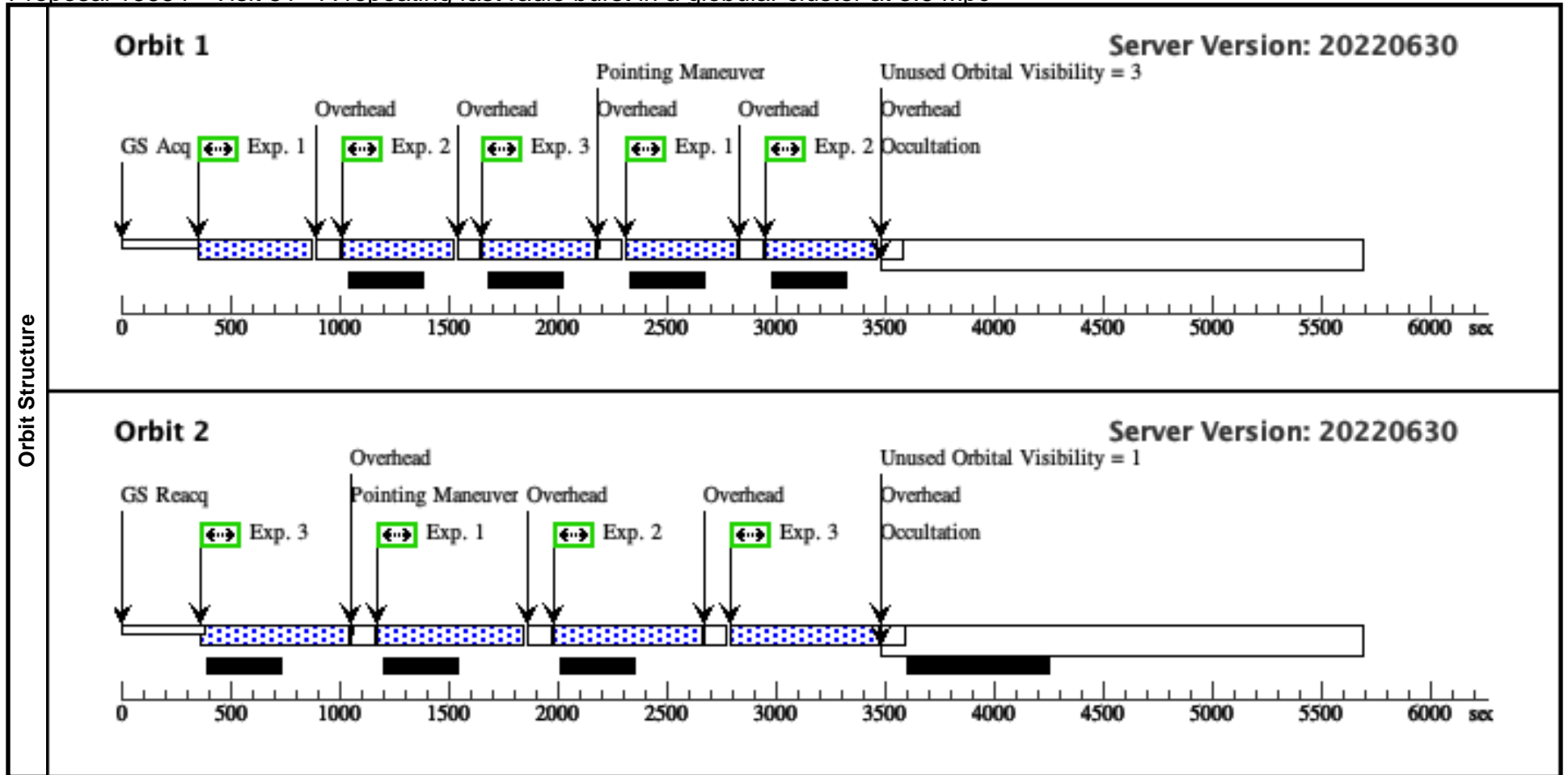
Visit	Proposal 16664, Visit 01, failed Diagnostic Status: Warning Scientific Instruments: WFC3/UVIS Special Requirements: (none)									
	Diagnosics (Visit 01) Warning (Orbit Planner): ORBITAL VISIBILITY OVERRUN (814W (01.001)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser (438W (01.003)) Warning (Form): FLASH level may be too low for this exposure or a short subexposure. See extended explanation in the diagnostic browser									
Patterns	#	Primary Pattern	Secondary Pattern		Exposures					
	(2)	Pattern Type=WFC3-UVIS-DITHER- LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.135 Line Spacing= Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false			(1-3)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	M81-GC	RA: 09 57 54.7030 (149.4779292d) Dec: +68 49 0.80 (68.81689d) Equinox: J2000		V=19.76	Reference Frame: ICRS				
<i>Comments:</i> Category=STELLAR CLUSTER Description=[GLOBULAR CLUSTER]										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	814W	(1) M81-GC	WFC3/UVIS, ACCUM, UVIS1	F814W		GS ACQ SCENARI O BASE1BE	Pattern 2, Exps 1-3 i n Visit 01 (2)	400 Secs (1651 Secs)	
									[==>497.0 Secs (Pattern 1)]	[1]
									[==>497.0 Secs (Pattern 2)]	[1]
									[==>657.0 Secs (Pattern 3)]	[2]
	2	606W	(1) M81-GC	WFC3/UVIS, ACCUM, UVIS1	F606W			Pattern 2, Exps 1-3 i n Visit 01 (2)	400 Secs (1651 Secs)	
									[==>497.0 Secs (Pattern 1)]	[1]
									[==>497.0 Secs (Pattern 2)]	[1]
									[==>657.0 Secs (Pattern 3)]	[2]
	3	438W	(1) M81-GC	WFC3/UVIS, ACCUM, UVIS1	F438W	FLASH=9		Pattern 2, Exps 1-3 i n Visit 01 (2)	400 Secs (1810 Secs)	
								[==>497.0 Secs (Pattern 1)]	[1]	
								[==>656.0 Secs (Pattern 2)]	[1]	
								[==>657.0 Secs (Pattern 3)]	[2]	



Proposal 16664 - Visit 51 - A repeating fast radio burst in a globular cluster at 3.6 Mpc

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Visit	Proposal 16664, Visit 51, failed Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: (none) <i>Comments: Duplicate for failed visit 01.</i>										
	Patterns	#	Primary Pattern				Secondary Pattern			Exposures	
		(2)	Pattern Type=WFC3-UVIS-DITHER- LINE-3PT Purpose=DITHER Number Of Points=3 Point Spacing=0.135 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=46.84 Angle Between Sides= Center Pattern=false				(1-3)			
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(1)	M81-GC	RA: 09 57 54.7030 (149.4779292d) Dec: +68 49 0.80 (68.81689d) Equinox: J2000				V=19.76		Reference Frame: ICRS		
	<i>Comments:</i> Category=STELLAR CLUSTER Description=[GLOBULAR CLUSTER]										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1	814W	(1) M81-GC	WFC3/UVIS, ACCUM, UVIS1	F814W	FLASH=5	GS ACQ SCENARI O BASE1BE	Pattern 2, Exps 1-3 i n Visit 51 (2)	400 Secs (1639 Secs)		
									[=>492.0 Secs (Pattern 1)]		[1]
									[=>492.0 Secs (Pattern 2)]		
									[=>655.0 Secs (Pattern 3)]		[2]
	2	606W	(1) M81-GC	WFC3/UVIS, ACCUM, UVIS1	F606W			Pattern 2, Exps 1-3 i n Visit 51 (2)	400 Secs (1639 Secs)		
									[=>492.0 Secs (Pattern 1)]		[1]
								[=>492.0 Secs (Pattern 2)]			
								[=>655.0 Secs (Pattern 3)]		[2]	
3	438W	(1) M81-GC	WFC3/UVIS, ACCUM, UVIS1	F438W	FLASH=13		Pattern 2, Exps 1-3 i n Visit 51 (2)	400 Secs (1801 Secs)			
								[=>492.0 Secs (Pattern 1)]		[1]	
								[=>654.0 Secs (Pattern 2)]			
								[=>655.0 Secs (Pattern 3)]		[2]	



Proposal 16664 - Visit 52 - A repeating fast radio burst in a globular cluster at 3.6 Mpc

Thu Dec 01 21:00:22 GMT 2022

Visit	Proposal 16664, Visit 52		
	Diagnostic Status: No Diagnostics		
	Scientific Instruments: WFC3/UVIS		
	Special Requirements: ORIENT 110D TO 177 D		

Patterns	#	Primary Pattern	Secondary Pattern	Exposures
	(3)	Pattern Type=WFC3-UVIS-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.173 Line Spacing=0.112	Coordinate Frame=POS-TARG Pattern Orientation=23.884 Angle Between Sides=81.785 Center Pattern=false	

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	M81-GC	RA: 09 57 54.7030 (149.4779292d) Dec: +68 49 0.80 (68.81689d) Equinox: J2000		V=19.76	Reference Frame: ICRS

Comments:
 Category=STELLAR CLUSTER
 Description=[GLOBULAR CLUSTER]

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(1) M81-GC	WFC3/UVIS, ACCUM, UVIS1	F606W				Pattern 3, Exps 1-1 in Visit 52 (3)	600 Secs (2708 Secs) [=>677.0 Secs (Pattern 1)] [=>677.0 Secs (Pattern 2)] [=>677.0 Secs (Pattern 3)] [=>677.0 Secs (Pattern 4)]	[1]

