



16072 - Constraining the local environment and possible binarity of the closest-known Fast Radio Burst source

Cycle: 27, 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) SDSSJ015800.28+654253.0	WFC3/UVIS	1	06-Mar-2020 09:00:16.0	yes
02	(1) SDSSJ015800.28+654253.0	WFC3/UVIS	1	06-Mar-2020 09:00:16.0	yes
03	(1) SDSSJ015800.28+654253.0	WFC3/IR	2	06-Mar-2020 09:00:17.0	yes

4 Total Orbits Used

ABSTRACT

Fast Radio Bursts (FRBs) are millisecond-timescale radio transients that originate at cosmological distances. The origins of FRBs are unknown, though a plethora of models invoking sources from young magnetars to binary neutron star mergers have been proposed. The environments in which these FRBs originate, the local stellar population age, metallicity, and star-formation rate can constrain the origins of FRBs. Some FRBs have been observed to repeat, though it is not clear whether the as-yet-single bursts are a different population or whether their faint repeat bursts simply have not been detected yet. There are six FRBs that have been localized with sufficient precision to identify their host galaxies in very diverse local environments, most at distances >1 Gpc. A second repeating FRB 180916 has been localized to a nearby face-on spiral galaxy at a distance of 149 Mpc, providing an opportunity to set the best constraints on the immediate environment of an FRB source. Separately, a 16.35-day periodicity has been discovered in the burst activity of FRB 180916 --- a momentous discovery for our understanding of FRBs. A modulation induced by orbital motion could feasibly explain such a period. The proposed observations are sufficiently sensitive to detect a single O3V (or brighter) star at the location of the FRB and measure the local star-formation rate with a precision of 0.01 MSun/year. These observations, along with previously acquired ground-based integral field spectroscopy will allow us to study the hyper-local environment of FRB 180916, its chemical composition, and dynamics, leading to the most detailed dataset to constrain the models for FRB emission.

OBSERVING DESCRIPTION

The aim of this observation is to acquire deep optical and IR imaging of the galaxy to search for stellar clusters or OB associations at the location of the FRB. The deep imaging will be done in the F110W filter (IR) and the H α On/Off imaging (to constrain local star formation rate) will be done in the F673N and F657N filters (UVIS). The host galaxy itself is about 10" in size and the region surrounding it (~20" radius) is of interest to search for satellite galaxies or any morphological signs of interaction. Apart from these constraints, the orientation, observation epoch etc are not critical.

Proposal 16072 - Halpha ON (01) - Constraining the local environment and possible binarity of the closest-known Fast Radio Burst so...

Fri Mar 06 14:00:18 GMT 2020

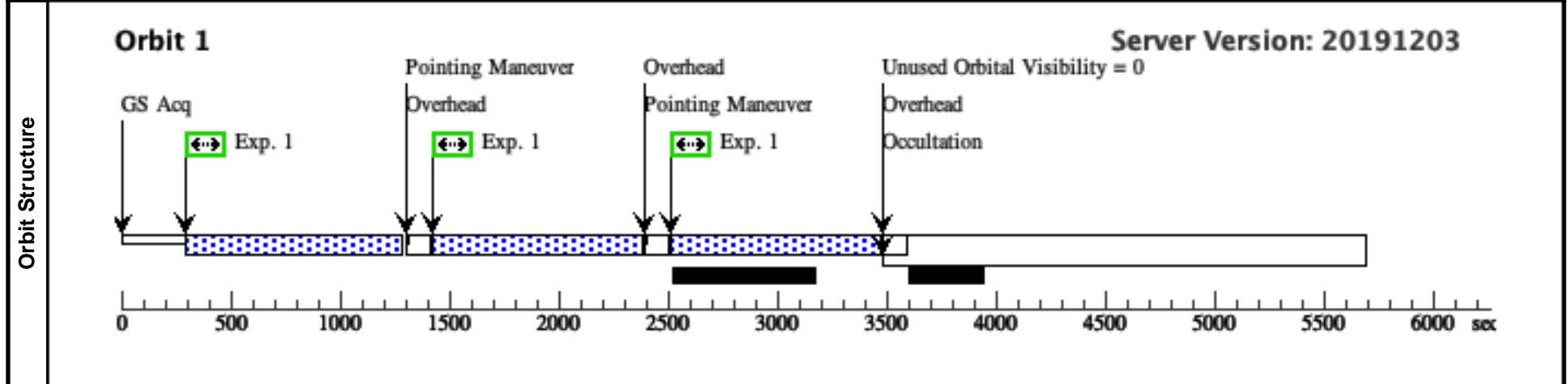
Visit	Proposal 16072, Halpha ON (01) Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: (none) <i>Comments: One visit for Halpha ON imaging (F673N)</i>		

Patterns	#	Primary Pattern	Secondary Pattern	Exposures
	(3)	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	

Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
	(1)	SDSSJ015800.28+654253.0	RA: 01 58 0.2800 (29.5011667d) Dec: +65 42 53.00 (65.71472d) Equinox: J2000			V=18

Comments: Category=GALAXY Description=[SPIRAL]

Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	WFC3/UVIS Halpha ON	(1) SDSSJ015800.28 +654253.0	WFC3/UVIS, ACCUM, UVIS1	F673N	FLASH=9			Pattern 3, Exps 1-1 in Halpha ON (01) (3)	900 Secs (2877 Secs) [=>959.0 Secs (Pattern 1)] [=>959.0 Secs (Pattern 2)] [=>959.0 Secs (Pattern 3)]



Proposal 16072 - Halpha OFF (02) - Constraining the local environment and possible binarity of the closest-known Fast Radio Burst s...

Fri Mar 06 14:00:18 GMT 2020

Visit	Proposal 16072, Halpha OFF (02) Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/UVIS Special Requirements: (none) <i>Comments: One visit for Halpha OFF (F657N)</i>										
	Patterns	#	Primary Pattern				Secondary Pattern			Exposures	
(3)		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)		
Fixed Targets	#	Name	Target Coordinates		Targ. Coord. Corrections		Fluxes		Miscellaneous		
	(1)	SDSSJ015800.28+654253.0	RA: 01 58 0.2800 (29.5011667d) Dec: +65 42 53.00 (65.71472d) Equinox: J2000				V=18		Reference Frame: Marcote et al 2020		
<i>Comments: Category=GALAXY Description=[SPIRAL]</i>											
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit	
	1	WFC3/UVIS Halpha OFF (02) (3)	(1) SDSSJ015800.28 +654253.0	WFC3/UVIS, ACCUM, UVIS1	F657N	FLASH=9		Pattern 3, Exps 1-1 in Halpha OFF (02) (3)	900 Secs (2877 Secs) [==>959.0 Secs (Pattern 1)] [==>959.0 Secs (Pattern 2)] [==>959.0 Secs (Pattern 3)]	[1]	
Orbit Structure	Orbit 1 Server Version: 20191203										
	<p>The diagram illustrates the orbital structure for Orbit 1. The x-axis represents time in seconds from 0 to 6000. Key events are marked: GS Acq at 0s, three exposures (Exp. 1) at approximately 350s, 1450s, and 2550s, and an occultation starting at 3500s. Pointing maneuvers and overheads are indicated between exposures. A blue checkered bar represents the orbital visibility window, which ends at approximately 5500s. Unused orbital visibility is shown as a black bar from 3500s to 5500s.</p>										

Proposal 16072 - Deep IR imaging (03) - Constraining the local environment and possible binarity of the closest-known Fast Radio Bur...

Fri Mar 06 14:00:18 GMT 2020

Visit	Proposal 16072, Deep IR imaging (03) Diagnostic Status: No Diagnostics Scientific Instruments: WFC3/IR Special Requirements: (none) <i>Comments: Two orbits for deep F110W imaging</i>										
	Patterns	#	Primary Pattern			Secondary Pattern			Exposures		
		(1)	Pattern Type=WFC3-IR-DITHER-BOX-MIN Purpose=DITHER Number Of Points=4 Point Spacing=0.572 Line Spacing=0.365	Coordinate Frame=POS-TARG Pattern Orientation=18.528 Angle Between Sides=74.653 Center Pattern=false							(1-2)
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections		Fluxes	Miscellaneous				
	(1)	SDSSJ015800.28+654253.0	RA: 01 58 0.2800 (29.5011667d) Dec: +65 42 53.00 (65.71472d) Equinox: J2000			V=18	Reference Frame: Marcote et al 2020				
	<i>Comments: Category=GALAXY Description=[SPIRAL]</i>										
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1	Deep IR Imaging with F110W (700 sec)	(1) SDSSJ015800.28+654253.0	WFC3/IR, MULTIACCUM, IR	F110W	SAMP-SEQ=SPARS 50; NSAMP=15		Pattern 1, Exps 1-2 in Deep IR imaging (03) (1)	702.938605 Secs (2811.754 Secs)		
									[=>(Pattern 1)]		[1]
									[=>(Pattern 2)]		[2]
									[=>(Pattern 3)]		[2]
								[=>(Pattern 4)]			
2	Deep IR Imaging with F110W (800 sec)	(1) SDSSJ015800.28+654253.0	WFC3/IR, MULTIACCUM, IR	F110W	SAMP-SEQ=SPARS 50; NSAMP=15		Pattern 1, Exps 1-2 in Deep IR imaging (03) (1)	702.938605 Secs (2811.754 Secs)			
								[=>(Pattern 1)]		[1]	
								[=>(Pattern 2)]		[2]	
								[=>(Pattern 3)]		[2]	
								[=>(Pattern 4)]			

