



## 16426 - Title: The Moving Filament of the Guitar Nebula

Cycle: 28, 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) PSR-B2224+65	ACS/WFC	3	14-Sep-2020 18:00:12.0	yes

3 Total Orbits Used

### ABSTRACT

We propose a new observation of the remarkable X-ray `filament' of the Guitar nebula. Synchrotron emission from this structure shows that pulsar-generated multi-TeV  $e^{\pm}$  are escaping to the ISM and propagating at large angle to the pulsar motion. Our observation provides the first sensitive spectral study of the cooling in this structure, which probes the  $e^{\pm}$  evolution. This pulsar's very high proper motion shifts the  $e^{\pm}$  injection position noticeably between CXO imaging epochs; the 2021 image can be compared with past (2012, 2006 and 2000) snapshots to directly measure the synchrotron fading with age. Paired with a contemporaneous HST Halpha image, we also relate the standoff of the pulsar bowshock to the filament emission, a key test of particle escape models.

**OBSERVING DESCRIPTION**

ACS/WFC F658+F625

Proposal 16426 - Guitar Filament (01) - Title: The Moving Filament of the Guitar Nebula

Mon Sep 14 22:00:13 GMT 2020

Visit	<b>Proposal 16426, Guitar Filament (01), implementation</b> <b>Diagnostic Status: No Diagnostics</b> Scientific Instruments: ACS/WFC Special Requirements: PCS MODE FINE; CVZ: ORIENT 103D TO 106.8 D									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
	(1)	Pattern Type=SPIRAL Purpose=DITHER Number Of Points=5 Point Spacing=0.325 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=0 Angle Between Sides= Center Pattern=true		(1)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	PSR-B2224+65	RA: 22 25 52.1020 (336.4670917d) Dec: +65 35 34.28 (65.59286d) Equinox: J2000		V=28	Reference Frame: SIMBAD				
	<i>Comments: Donot pplyt PM to target position.</i> Category=STAR Description=[PULSAR]									
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]	Orbit
	1	(1) PSR-B2224+65	ACS/WFC, ACCUM, WFC1-CTE	F658N				Pattern 1, Exps 1-1 i n Guitar Filament (0 1) (1)	2907 Secs (14535 Secs)	
								[==>(Pattern 1)]		[1]
								[==>(Pattern 2)]		
								[==>(Pattern 3)]		[2]
								[==>(Pattern 4)]		
								[==>(Pattern 5)]		[3]
	2	(1) PSR-B2224+65	ACS/WFC, ACCUM, WFC1-CTE	F625W					338 Secs (338 Secs)	
								[==>]		[3]
	3	(1) PSR-B2224+65	ACS/WFC, ACCUM, WFC1-CTE	F625W			POS TARG -0.3285 352373787485,-0.00 25006296076491782		338 Secs (338 Secs)	
								[==>]		[3]

