10763 - The Guitar Nebula: A Bow Shock that Traces ISM Turbulence and Accelerates Relativistic Particles

Cycle: 14, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

Visit	*Targets*	*Configurations*	*Orbits Used*	*Last Orbit Planner Run*	*OP Current with Visit?*
01	(1) GUITAR-NEBULA	ACS/WFC	3	12-Oct-2005 21:07:56.0	yes

3 Total Orbits Used

ABSTRACT

We propose joint Chandra and HST observations of the Guitar Nebula, an extraordinary bow-shock nebula produced by a very high-velocity but otherwise ordinary pulsar. Prior HST observations show epoch dependent changes in shock structure that signify changing ISM conditions. An enigmatic jet or filament is seen in a Chandra ACIS image (year 2000), unlike jets from the Crab or other young pulsars. New Chandra observations

will reveal the relative motion of the jet and the pulsar (which has moved by 0.9 arcsec) and thus determine if self confinement or special structure in the ISM plays a dominant role in shaping the jet, and will constrain the particle acceleration mechanism. We request joint high-resolution HST observations to contemporaneously determine the ISM density profile.

OBSERVING DESCRIPTION

The Guitar Nebula is an extended bow shock nebula, approximately 85 arcsec long and 40 arcsec wide, at a position angle of 50 degrees E of N. The key region of interest is the tip of the bow shock, where the high velocity pulsar B2224+65 probes the changing interstellar medium density.

We have described our target as a circular region 85 arcsec in diameter, centered at (RA=22:25:47.745, Dec=+65:35:08.84, J2000) but it is critically important that the tip, located at (RA=22:25:52.5, Dec=+65:35:34.3, J2000), is imaged on the WFC chip, away from the chip gap and the edges. Instead of specifying an ORIENT constraint, we have centered the nebula at WFC1-FIX, which accomodates the entire nebula on WFC1.

We use a 12-point dither pattern and the F658N narrow band filter to image the H-alpha nebula, resulting in individual exposures of 1225 sec, spanning 3 CVZ orbits.

Visit

Proposal 10763, Visit 01 Thu Oct 13 01:08:00 GMT 2005

Diagnostic Status: No Diagnostics

Scientific Instruments: ACS/WFC

Special Requirements: CVZ

Patterns

#	Primary Pattern		Secondary Pattern		Exposures
(1)	Pattern Type=ACS-WFC-DITHER-LINE Purpose=DITHER Number Of Points=3 Point Spacing=3.011 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=85.3 Angle Between Sides= Center Pattern=true	Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.265 Line Spacing=0.187	Coordinate Frame=POS-TARG Pattern Orientation=20.7 Angle Between Sides=69.1 Center Pattern=true	(1)

Fixed Targets

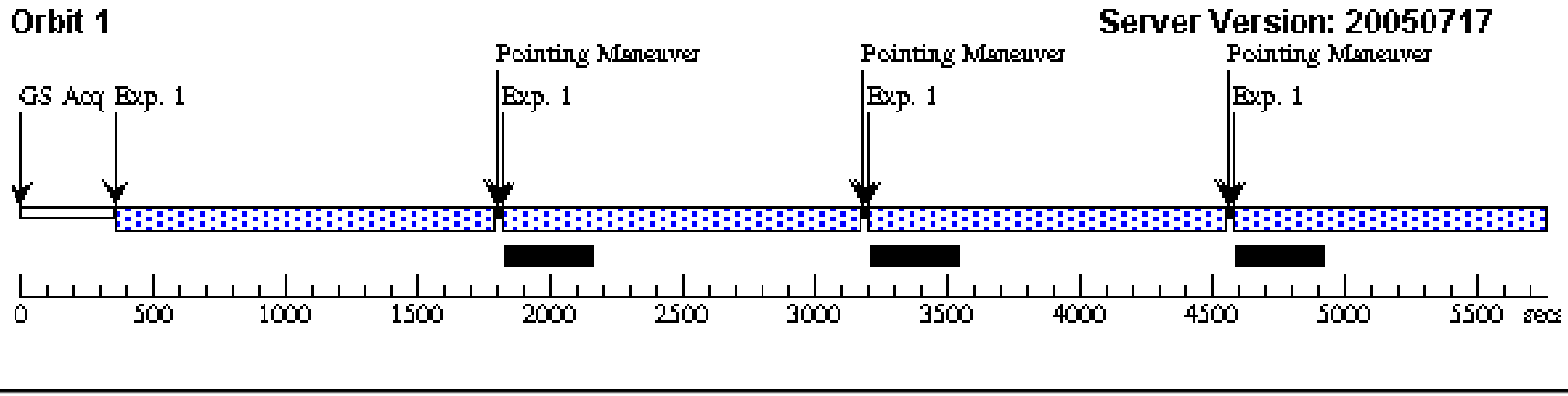
#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous
(1)	GUITAR-NEBULA Alt Name1: NEB-222552+653531	RA: 22 25 47.7450 (336.4489375d) Dec: +65 35 8.84 (65.58579d) Equinox: J2000 Plate Id: 034Q		V=(?) F-LINE(6563)=2E-15	Region Position (GUITAR-NEBULA) Coordinate Source: HST_IMAGE

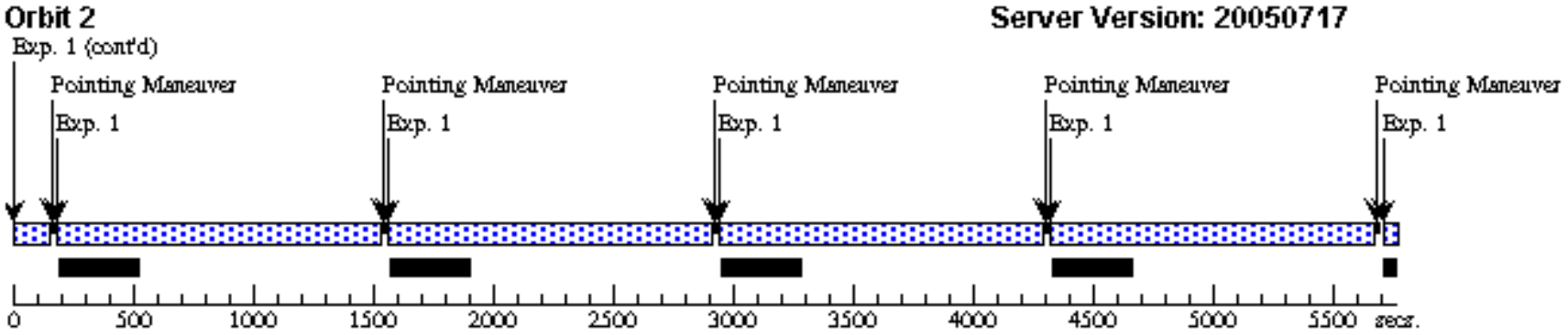
Comments: Prior HST observations used
DGESTAR = '0427600582F2' (2001)
DGESTAR = '0427600550F2' (1994).

Exposures

#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
1	H-alpha	(1) GUITAR-NEBULA	ACS/WFC, ACCUM, WFC1-FIX	F658N	CR-SPLIT=NO		Pattern 1-1 (1)	1224.0 Secs	
								[==>(Pattern 1,1)]	***[1]***
								[==>(Pattern 1,2)]	
								[==>(Pattern 1,3)]	
								[==>(Pattern 1,4)]	
								[==>(Pattern 2,1)]	***[2]***
								[==>(Pattern 2,2)]	
								[==>(Pattern 2,3)]	
								[==>(Pattern 2,4)]	
								[==>(Pattern 3,1)]	
								[==>(Pattern 3,2)]	***[3]***
								[==>(Pattern 3,3)]	
								[==>(Pattern 3,4)]	

Orbit Structure





Orbit Structure (continued)