



16161 - Measuring Cosmic Ray Acceleration in a Young Supernova Remnant in the Large Magellanic Cloud: The Case for a Third Epoch Observation of SNR0519-69.0

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) SNR-B0519-69.0	ACS/WFC	2	02-Nov-2020 14:00:24.0	yes

2 Total Orbits Used

ABSTRACT

Supernova shocks have been long-favored as sites for accelerating cosmic rays (CR). They have been studied extensively in multiple wavebands to look for signatures of accelerated particles in the strong amplified magnetic fields created at shock fronts. In this proposal, we present an optical-only study of CR acceleration, by examining a specific class of astrophysical shocks known as 'Balmer shocks'. Our target is supernova remnant (SNR) 0519-69.0 in the Large Magellanic Cloud (LMC) that has strong Balmer emission. We propose a third ACS/WFC observation of this SNR, which will provide a ~10 year baseline to measure the proper motion of the remnant. The well known distance to the LMC allows one to convert the proper motions to accurate shock velocities. The shock velocities, combined with ground-based spectroscopic measurements of the broad H alpha line-widths will be used to calculate the CR acceleration efficiency over a broad range of shock velocities using state-of-the-art models. We demonstrate

Proposal 16161 (STScI Edit Number: 1, Created: Monday, November 2, 2020 at 2:00:24 PM Eastern Standard Time) - Overview

the significant reduction in shock velocity uncertainties resulting from increasing the time baseline from the current 1 year to 10 years. We highlight the importance of matching the observational configuration to minimize systematic errors in the proper motion. With the new observation, we aim to reveal the dependence of CR acceleration efficiency on shock velocity.

OBSERVING DESCRIPTION

This is a single filter observation will be a four point dither pattern with cosmic-ray splits over the course of 2 orbits. The filter needed is the ACS narrow-band H-alpha filter F658N. We request for a roll-angle of 131.25 (+/- 5) degrees.

Proposal 16161 - Visit 01 - Measuring Cosmic Ray Acceleration in a Young Supernova Remnant in the Large Magellanic Cloud: The ...

Mon Nov 02 19:00:24 GMT 2020

Visit	Proposal 16161, Visit 01, implementation Diagnostic Status: No Diagnostics Scientific Instruments: ACS/WFC Special Requirements: ORIENT 126.25D TO 136.25 D <i>Comments: We request that the Orient be as close to 131.25 degrees as possible in order to match the previous observation (Proposal ID: 12017) in 2010 and 2011, which had a PA_APER value of 128.781. This is done so that the PSFs of the first epoch images precisely match that of the new image to be obtained here.</i>										
	Patterns	#	Primary Pattern				Secondary Pattern			Exposures	
(1)		Pattern Type=ACS-WFC-DITHER-BOX Purpose=DITHER Number Of Points=4 Point Spacing=0.262 Line Spacing=0.192	Coordinate Frame=POS-TARG Pattern Orientation=18.39 Angle Between Sides=68.14 Center Pattern=false						(1)		
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous					
	(1)	SNR-B0519-69.0	RA: 05 19 34.7800 (79.8949167d) Dec: -69 02 8.80 (-69.03578d) Equinox: J2000	Epoch of Position: 2015.5	V=17.5+/-0.5 SURF-LINE(6563)=2e-16	Reference Frame: SIMBAD					
<i>Comments: This object was generated by the targetselector and retrieved from the SIMBAD database.</i> Category=EXT-MEDIUM Description=[EMISSION LINE NEBULA, SHOCK FRONT, SNR]											
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time (Total)/[Actual Dur.]		Orbit
	1	(1) SNR-B0519-69.0	ACS/WFC, ACCUM, WFC2	F658N	CR-SPLIT=2	GS ACQ SCENARI O BASE1B3	Pattern 1, Exps 1-1 i n Visit 01 (1)	1155 Secs (4971 Secs)			
									[==>613.0 Secs (Pattern 1, Split 1)]	[1]	
									[==>612.0 Secs (Pattern 1, Split 2)]		
									[==>612.0 Secs (Pattern 2, Split 1)]		
									[==>612.0 Secs (Pattern 2, Split 2)]		
									[==>631.0 Secs (Pattern 3, Split 1)]	[2]	
									[==>631.0 Secs (Pattern 3, Split 2)]		
									[==>630.0 Secs (Pattern 4, Split 1)]		
									[==>630.0 Secs (Pattern 4, Split 2)]		

