



10601 - The high proper motion of PSR B0540-69.3

Cycle: 14, Proposal Category: GO

(Availability Mode: SUPPORTED)

INVESTIGATORS

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VISITS

<i>Visit</i>	<i>Targets</i>	<i>Configurations</i>	<i>Orbits Used</i>	<i>Last Orbit Planner Run</i>	<i>OP Current with Visit?</i>
01	(1) PSR-B0540-69.3	WFPC2	1	14-Sep-2005 13:53:49.0	yes

1 Total Orbits Used

ABSTRACT

We wish to pin down the proper motion of the Crab-like pulsar PSR B0540-69.3. HST/WFPC2 archival data have an epoch separation by 4 years which we have already used to obtain a very high transverse velocity, 1190 +/- 560 km/s. The indicated direction of the proper motion is consistent with it being along the southern jet of the pulsar wind nebula. The high velocity could be linked to the high asymmetry of the supernova ejecta, which suggests a highly asymmetric supernova explosion. We need a third epoch of HST imaging to test our present 2-sigma limit.

With the suggested observation we will obtain a 1-sigma limit on the transverse motion better than 200 km/s. PSR B0540-69.3 could be the third

young pulsar connected to a supernova remnant for which a proper motion is established. The other two are the Crab and Vela pulsars. Both these pulsars have their proper motions aligned with the jet axis of their pulsar wind nebulae. PSR B0540-69.3 could thus be the third object (of three) to reveal that it shares this property. This would provide vital information to supernova explosion and pulsar kick models. PSR B0540-69.3 would undoubtedly also be the most distant pulsar ever for which a proper motion is established.

OBSERVING DESCRIPTION

We wish to pin down the proper motion of the Crab-like pulsar PSR B0540-69.3. HST/WFPC2 archival data have an epoch separation by 4 years which we have already used to obtain a very high transverse velocity, 1190 ± 560 km/s. The indicated direction of the proper motion is consistent with it being along the southern jet of the pulsar wind nebula. The high velocity could be linked to the high asymmetry of the supernova ejecta, which suggests a highly asymmetric supernova explosion. We need a third epoch of HST imaging to test our present 2-sigma limit. We were granted time to do this. Our proposal was submitted as a SNAP proposal, but that was converted by TAC to a 1-orbit GO program. With the suggested observation we will obtain a 1-sigma limit on the transverse motion better than 200 km/s. We will use WFPC2 equipped with the filters F547M and F555W to optimize the comparison with archival data (as was also suggested in the proposal).

Proposal 10601 - Visit 01 - The high proper motion of PSR B0540-69.3

Wed Sep 14 17:54:11 GMT 2005

Visit	Proposal 10601, Visit 01 Diagnostic Status: No Diagnostics Scientific Instruments: WFPC2 Special Requirements: (none)									
	Patterns	#	Primary Pattern	Secondary Pattern	Exposures					
		(1)	Pattern Type=WFPC2-LINE Purpose=DITHER Number Of Points=2 Point Spacing=0.354 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=45 Angle Between Sides= Center Pattern=false		(1-2)				
	(2)	Pattern Type=WFPC2-LINE Purpose=DITHER Number Of Points=3 Point Spacing=0.354 Line Spacing=	Coordinate Frame=POS-TARG Pattern Orientation=45 Angle Between Sides= Center Pattern=false		(3)					
Fixed Targets	#	Name	Target Coordinates	Targ. Coord. Corrections	Fluxes	Miscellaneous				
	(1)	PSR-B0540-69.3	RA: 05 40 11.1730 (85.0465542d) Dec: -69 19 54.41 (-69.33178d) Equinox: J2000 Plate Id: 06B0		V=21.7	Coordinate Source: HST_IMAGE				
Exposures	#	Label	Target	Config,Mode,Aperture	Spectral Els.	Opt. Params.	Special Reqs.	Groups	Exp. Time/[Actual Dur.]	Orbit
	1	F547M 520	(1) PSR-B0540-69.3	WFPC2, IMAGE, PC1	F547M				Pattern 1-2 (1)	520.0 Secs [==>260.0 Secs (Pattern 1)] [==>260.0 Secs (Pattern 2)]
	2	F547M 520	(1) PSR-B0540-69.3	WFPC2, IMAGE, PC1	F547M			Pattern 1-2 (1)	520.0 Secs [==>260.0 Secs (Pattern 1)] [==>260.0 Secs (Pattern 2)]	[1]
	3	F555W 480	(1) PSR-B0540-69.3	WFPC2, IMAGE, PC1	F555W			Pattern 3-3 (2)	480.0 Secs [==>160.0 Secs (Pattern 1)] [==>160.0 Secs (Pattern 2)] [==>160.0 Secs (Pattern 3)]	[1]

