Observing Application

Date :	Jul, 10 2012
Proposal ID :	VLA/12A-486
Legacy ID :	AB1439
PI :	Michael Bietenholz
Type :	Director's Discretionary Time - Target of Opportunity
Category :	Energetic Transients and Pulsars
Total Time :	15.0

Finding the Radio Counterparts to the Crab Nebula's Gamma-Ray Flares

Abstract:

A strong gamma-ray flare from the Crab Nebula was recently detected with the Fermi LAT (July 3 to 8), with the daily average flux (> 100 Mev) reaching a value which represents an almost 6-fold increase in the nebular flux. We request three epochs of 5 hours each of JVLA time to observe the Crab at 5 GHz to attempt to locate the radio counterpart of the gamma-ray flare. The Crab's gamma-ray flares are not well understood and pose significant challenges to most acceleration models. Most possible explanations involve variations in the magnetic fields which would result in some level of increased and localized radio emission. In fact, a probable radio counterpart to an earlier flare has already been seen in VLBI observations. The presently proposed JVLA observations would be considerably more sensitive and more prompt than the earlier VLBI observations, as well as allowing an estimate of the spectral index. Both localizing the flare within the nebula, and constraining the energetics through measurements of the radio brightness and spectrum, would provide important constraints for understanding the physics of the flares and of the Crab's acceleration process in general.

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Related proposals:

AB988, AB876

Joint:

Not a Joint Proposal

Observing type(s):

Continuum, Single Pointing(s)

VLA Resources

Name	Conf.	Frontend & Backend	Setup
C-band wide	B	C Band 6 cm 4000-8000 MHz WIDAR OSRO, Full Polarization	Rest frequencies: 5000.0,6000.0 MHz Subband Bandwidth: 128.0 MHz No. of Channels: 64 Poln. products: 4.0 Channel Width: 2000.0 kHz Total Bandwidth: 2,048.00 MHz

Testing Resource Images

Sources:

Name	Position		Velocity		Group
Crab	**Coordinate System**	Equatorial	**Convention**	Radio	Crab Nebula
	Equinox	J2000			
	Right Ascension	05:34:31.97	**Ref. Frame**	LSRK	
		00:00:00.0			
	Declination	+22:00:52.0	**Velocity**	0.00	
		00:00:00.0			

Sessions:

Name	Session Time (hours)	Repeat	Separation	LST minimum	LST maximum	Elevation Minimum
Crab B-array	5.00	3	10 day	00:00:00	23:59:59	10

Session Constraints:

Name	Constraints	Comments
Crab B-array	Please schedule the first session as soon as is practical, and the two subsequent ones in intervals of approximately 10 days	

Session Source/Resource Pairs:

Session Name	Source	Resource	Time	Figure of Merit	Subarray
Crab B-array	Crab	C-band wide	5.0 hour	0.01 mJy/bm	

Present for observation: no Staff support: None Plan of Dissertation: no