Observing Application

Date :	Jul, 01 2011
Proposal ID :	VLBA/11A-282
Legacy ID :	BB307
PI :	Matthias Beilicke
Type :	Director's Discretionary Time - Target of Opportunity
Category :	Active Galactic Nuclei
Total Time :	24.0

Pinpointing the emission region of a recent VHE gamma-ray flare of BL Lacertae

Abstract:

On June 28, 2011 VERITAS detected a bright very-high-energy (VHE; E>100 GeV) gamma-ray flare from BL Lacertae reaching the highest flux level observed so far from this object: 50% of the Crab nebula flux (see ATel 3459). This is a very rare event. At the same time Fermi/LAT reported a substantial hardening of the MeV/GeV gamma-ray spectrum. BL Lacertae (z = 0.07) is considered a proto-type of the blazars subclass of AGN. The region of the VHE emission in blazars is still a matter of debate. Given its vicinity and huge black hole mass, BL Lacertae is one of only a few VHE blazars for which detailed structures in the jet can be resolved with the VLBA. The recent VERITAS flare together with VLBA follow-up observations represents a unique chance to locate the site of the VHE emission by correlating the flare with new radio blobs or passage of a blob through the standing shock and therefore to test the structure of the jet and its population of relativistic particles.

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Related proposals:

Joint:

Not a Joint Proposal

Observing type(s):

Single Pointing(s)

VLBA Resources

Name	Details	Stations	Observing Parameters	Correlation Parameters
TeVBlazars512Mb	**Wavelength:** 7 mm **Processor:** Socorro-DiFX **Observing** Standard	VLBA ☑ Br ☑Fd ☑Hn ☑Kp ☑ La ☑Mk ☑Kp ☑Ov ☑ Pt ☑Sc ☑ HSA Ar Ef GBT VLA-Y27 VLA-Y1 Geodetic	Bandwidth: 16 MHz Baseband Channels 8 Sample Rate (Msample/s) 32 Bits/Sample 2 Polarization RCP Agg. Bit Rate (Mbits/sec)	Full Polarization ☑ Pulsar Gate Correlator Passes 1 Integration Period (sec) 2.0 Spectral Points /BBC 32 No of Fields 0

Sources:

Name	Position		Velocity		Group
BLLacertae	**Coordinate System**	Equatorial	**Convention**	Optical	TeV blazar BL Lacertae
	Equinox	J2000			
	Right Ascension	22:02:43.29	**Ref. Frame**	Barycentric	
		00:00:00.0			
	Declination	+42:16:39.9	**Redshift**	0.06860	
		00:00:00.0			

Sessions:

Name	Session Time (hours)	Repeat	Separation	GST minimum	GST maximum	Elevation Minimum
BL Lac ToO	12.00	2	30 day	16:00:00	04:30:00	0

Session Constraints:

Name	Constraints	Comments
BL Lac ToO		Ideally, the sessions would fit into the existing BM303 program so that BM303 and this ToO would result in observations each 2 weeks. The first observation of this ToO would ideally take place end of June/very early July, the second session of this ToO around end of July.

Session Source/Resource Pairs:

Session Name	Source	Resource	Time	Figure of Merit
BL Lac ToO	BLLacertae	TeVBlazars512Mbps	12.0 hour	mJy/bm

Staff support: None Plan of Dissertation: no