



Observing Application

Date : Jan, 20 2013
 Proposal ID : VLBA/12B-411
 Legacy ID : BR176
 PI : Bindu Rani
 Type : Director's Discretionary
 Time - Target of Opportunity
 Category : Active Galactic Nuclei
 Total Time : 16.0

ToO observations of BL Lacertae to follow the ongoing historic outburst

Abstract:

The blazar BL Lac is undergoing extreme flaring activity across the full electromagnetic spectrum, with an historic maximum of ~14.5 Jy at 230 GHz observed in December 2012 and rapid gamma-ray variability observed by the Fermi-Large Area Telescope. To detect sub-pc scale structural changes related to the flare activity, we propose immediate 3 mm ToO VLBI observations to be combined with ongoing sub-mm (Herschel) and X-ray (Swift) observations. The combination of the VLBA with at least two European antennas allows to reach angular scales of ~50 micro arc seconds corresponding to only ~720 Schwarzschild radii distance from the central black hole. The key objectives of the proposal are (1) to probe the inner core region after an extreme outburst, where at longer wavelength opacity and limited resolution make this difficult, (2) explore highly non-linear, presumably helical shock propagation related to the flare, (3) identify the location of the high energy emission region, and check if the gamma-rays are produced in a helical jet either by moving or colliding shocks.

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Related proposals:

Joint:

Not a Joint Proposal

Observing type(s):

Continuum, Polarimetry

VLBA Resources

Resource Name: 3mm global

Details	Stations	Observing Parameters	Correlation Parameters	Special Features
Wavelength: 3 mm Processor: Bonn Observing Mode: Standard	VLBA <input type="checkbox"/> Br <input checked="" type="checkbox"/> Fd <input checked="" type="checkbox"/> Hn <input type="checkbox"/> Kp <input checked="" type="checkbox"/> La <input checked="" type="checkbox"/> Mk <input checked="" type="checkbox"/> NI <input checked="" type="checkbox"/> Ov <input checked="" type="checkbox"/> Pt <input checked="" type="checkbox"/> Sc <input type="checkbox"/> <hr/> HSA <input type="checkbox"/> Ar <input type="checkbox"/> Ef <input checked="" type="checkbox"/> GBT <input type="checkbox"/> VLA-Y27 <input type="checkbox"/> <hr/> VLA-Y1 <input type="checkbox"/> <hr/> Geodetic	Observing System: DDC System Bandwidth: 32 MHz Baseband Channels: 4 Polarization: Dual Agg. Bit Rate (Mbits/sec): 512	Correlator Passes: 1 Integration Period (sec): 1.0 Spectral Points /BBC: 64 No of Fields: 1	Full Polarization <input checked="" type="checkbox"/> Pulsar Gate <input type="checkbox"/> Convert to Mark4 <input checked="" type="checkbox"/>

Sources:

Name	Position		Velocity		Group
BLLac	Coordinate System	Equatorial	Convention	Optical	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					
Calibrator	No				

Sessions:

Name	Session Time (hours)	Repeat	Separation	GST minimum	GST maximum	Elevation Minimum
A	8.00	2	60 day	21:00:00	05:00:00	0

Session Constraints:

Name	Constraints	Comments
A		combined with Eb, PV, Yb

Session Source/Resource Pairs:

Session Name	Source	Resource	Time	Figure of Merit
A	BLLac	3mm global	8.0 hour	0.5 mJy/bm

Staff support: Consultation

Plan of Dissertation: no