



Observing Application

Date : Jun, 10 2011
 Proposal ID : VLA/11A-275
 Legacy ID : AD643
 PI : Adam Deller
 Type : Director's Discretionary
 Time - Exploratory Time
 Category : High Redshift and Source
 Surveys
 Total Time : 3.0

A deep imaging search for VLBI astrometric calibrators

Abstract:

Precision VLBI astrometry requires calibrator sources as close as possible to the astrometric target. VLBI pulsar astrometry observations with a typical calibrator-target separation of ~15 arcminutes can give impressively accurate results (parallax errors of ~20 microarcseconds), but are nevertheless still generally dominated by residual ionospheric calibration errors. Reducing the average separation to just a few arcminutes is now possible in some circumstances by employing the high sensitivity available with upgraded VLBI systems and targeting sub-mJy sources. Such an approach should improve the attainable astrometric precision by a factor of several, potentially achieving ~5 microarcseconds or better. However, these sub-mJy VLBI sources must first be identified, and the most efficient way to do so is with a deep EVLA image of the field surrounding the target pulsar. Here I propose deep EVLA observations of the field surrounding PSR J1022+1001, a millisecond pulsar which is part of the International Pulsar Timing Array. A very precise parallax distance to this object could be used to considerably improve the sensitivity of searches to individual long-period gravitational wave sources.

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Related proposals:

Joint:

Not a Joint Proposal

Observing type(s):

Continuum

VLA Resources

Name	Conf.	Frontend & Backend	Setup
A-image	A	L Band 20 cm 1000 - 2000 MHz WIDAR RSRO	Comments: 1 GHz bandwidth, subband width as optimal to minimize data lost to RFI.

Sources:

Name	Position		Velocity		Group
J1022+1001	Coordinate System	Equatorial	Convention	Radio	MSP1
	Equinox	J2000			
	Right Ascension	10:22:58.3	Ref. Frame	LSRK	
		00:00:00.0			
Declination	+10:01:52.76	Velocity	0.00		
	00:00:00.0				
J1025+1253	Coordinate System	Equatorial	Convention	Radio	MSP1
	Equinox	J2000			
	Right Ascension	10:25:56.28537	Ref. Frame	LSRK	
		00:00:00.0			
Declination	+12:53:49.22	Velocity	0.00		
	00:00:00.0				
3c286	Coordinate System	Equatorial	Convention	Optical	MSP1
	Equinox	J2000			
	Right Ascension	13:31:08.28	Ref. Frame	Barycentric	
		00:00:00.0			
Declination	+30:30:32.9	Redshift	0.84935		
	00:00:00.0				

Sessions:

Name	Session Time (hours)	Repeat	Separation	LST minimum	LST maximum	Elevation Minimum
imaging	1.00	3	0 day	06:00	15:00:00	15

Session Constraints:

Name	Constraints	Comments

Session Source/Resource Pairs:

Session Name	Source	Resource	Time	Figure of Merit	Subarray
imaging	J1022+1001 J1025+1253 3c286	A-image	1.0 hour	12 mJy/bm	

Present for observation: no

Staff support: Consultation

Plan of Dissertation: no