



Observing Application

Date : Jan, 24 2011
Proposal ID : VLA/10B-246
Legacy ID : AD637
PI : Jeremy Darling
Type : Director's Discretionary
Time - Exploratory Time
Category : Extragalactic Structure
Total Time : 4.0

Mapping the Water Masers in M31 for VLBA Proper Motion Studies

Abstract:

We have detected and confirmed five water maser complexes in the Andromeda Galaxy (M31) using the Green Bank Telescope. These masers will provide the high brightness temperature point sources needed for proper motion studies of Andromeda, enabling the measurement of its full three-dimensional velocity vector and its proper rotation, which is a geometric distance indicator. The motion of M31 is the keystone of Local Group dynamics and a gateway to the dark matter profiles of galaxies in general. Our GBT survey for water masers selected 206 luminous compact 24 micron-emitting regions in M31 and was sensitive enough to detect any maser useful for ~10 microarcsecond per year astrometry with the VLBA. But the 33 arcsec GBT beam does not provide sufficient localization of the masers for immediate VLBA observations. We therefore request 2 hours of Exploratory EVLA A-array time to localize and map these masers in order to begin proper motion monitoring with the VLBA.

Authors:

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Related proposals:

GBT 10C-039

Joint:

Not a Joint Proposal

Observing type(s):

Spectroscopy, Single Pointing(s)

VLA Resources

Name	Conf.	Frontend & Backend	Setup
Water	A	K Band 1.3 cm 18000 - 26500 MHz WIDAR OSRO2: 1 Subband/Dual polz	Rest frequencies: 22235.08 MHz Subband Bandwidth: 4.0 MHz No. of Channels: 64 Poln. products: 4.0 Channel Width: 62.5 kHz

Sources:

Name	Position		Velocity		Group
003918+402158	Coordinate System	Equatorial	Convention	Optical	Water Masers
	Equinox	J2000			
	Right Ascension	00:39:18.0 00:00:00.0	Ref. Frame	Barycentric	
	Declination	+40:21:58.0 00:00:00.0	Velocity	-565.00	
004121+404947	Coordinate System	Equatorial	Convention	Optical	Water Masers
	Equinox	J2000			
	Right Ascension	00:41:21.0 00:00:00.0	Ref. Frame	Barycentric	
	Declination	+40:49:47.0 00:00:00.0	Velocity	-530.00	
004343+411137	Coordinate System	Equatorial	Convention	Optical	Water Masers
	Equinox	J2000			
	Right Ascension	00:43:43.0 00:00:00.0	Ref. Frame	Barycentric	
	Declination	+41:11:37.0 00:00:00.0	Velocity	-295.00	
004409+411856	Coordinate System	Equatorial	Convention	Optical	Water Masers
	Equinox	J2000			
	Right Ascension	00:44:09.0 00:00:00.0	Ref. Frame	Barycentric	
	Declination	+41:18:56.0 00:00:00.0	Velocity	-240	
004430+415154	Coordinate System	Equatorial	Convention	Optical	Water Masers
	Equinox	J2000			
	Right Ascension	00:44:30.0 00:00:00.0	Ref. Frame	Barycentric	
	Declination	+41:51:54.0 00:00:00.0	Velocity	-120.00	
3C48	Coordinate System	Equatorial	Convention	Optical	Water Masers
	Equinox	J2000			
	Right Ascension	01:37:41.29 00:00:00.0	Ref. Frame	Barycentric	
	Declination	+33:09:35.1 00:00:00.0	Velocity	-300	
0038+416	Coordinate System	Equatorial	Convention	Optical	Water Masers
	Equinox	J2000			
	Right Ascension	00:38:24.84 00:00:00.0	Ref. Frame	Barycentric	
	Declination	+41:37:06.0 00:00:00.0	Velocity	-300	

Sessions:

Name	Session Time (hours)	Repeat	Separation	LST minimum	LST maximum	Elevation Minimum
Mapping	2.00	1	0 day	21:00:00	03:00:00	0
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Session Constraints:

Name	Constraints	Comments
Mapping		The noise requirement is for data spectrally smoothed to 156 kHz channels (see Justification text).
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