Observing Application

Date :	Apr, 17 2012
Proposal ID :	VLBA/12A-468
Legacy ID :	BO41
PI :	Juergen Ott
Type :	Director's Discretionary Time - Exploratory Time
Category :	Active Galactic Nuclei
Total Time :	12.0

Nature of a newly detected water maser in the core of Centaurus A

Abstract:

Recently, we detected a water maser in Centaurus A with the Australia Telescope Compact Array. The maser location is within ~110pc of the central AGN (our beam size) and 400km/s offset to the systemic velocity. The most likely scenarios for the maser origin are a) a "disk maser" emerging from the accretion disk around the black hole or b) a "jet maser" emitted from the shocked material that the jet is impacting as it expands outwards. We request VLBA time as it is the only telescope with enough spatial resolution to distinguish between the two options. If confirmed a "disk maser", it would be the first in an early-type galaxy and by far the most nearby water maser in any AGN system. Disk masers are outstanding tools to study the details of the central kinematics and geometry, energetics, and distance. The rare "jet masers" would be used to study shock velocities, gas densities, and excitation and pumping mechanisms. They also promise to be a tool to determine jet velocities via follow-up reverberation campaigns. Water masers are typically time variable and thus we ask for a time allocation while the source is still observable.

Authors:

Name	Institution	Email	Status
Juergen Ott	National Radio Astronomy Observatory	jott@nrao.edu	
Dave Meier	New Mexico Institute of Mining and Technology	dmeier@nmt.edu	
Mark McCoy	New Mexico Institute of Mining and Technology	mmccoyemet@gmail.com	Graduating: N/A Thesis: false
Walter Brisken	National Radio Astronomy Observatory	wbrisken@nrao.edu	
Alison Peck	National Radio Astronomy Observatory/ALMA Chile	apeck@alma.cl	
C. M. Violette Impellizzeri	National Radio Astronomy Observatory	violette@nrao.edu	
Muller Sebastien	Onsala Space Observatory	mullers@chalmers.se	
Christian Henkel	Max-Planck-Institut für Radioastronomie	p220hen@mpifr-bonn.mpg.de	
Philip Edwards	Australia Telescope National Facility	philip.edwards@csiro.au	
Fabian Walter	Max-Planck-Institut fur Astronomie	walter@mpia.de	

Principal Investigator: Juergen Ott
Contact: Juergen Ott
Telephone: +1-575-835-7174
Email: jott@nrao.edu

Related proposals:

Joint:

Not a Joint Proposal

Observing type(s):

Spectroscopy

VLBA Resources

Name	Details	Stations	Observing Parameters	Correlation Parameters
H2O	**Wavelength:** 1.3 cm **Processor:** Socorro-DiFX **Observing** Standard	VLBA Br Fd ☑ Hn Kp ☑ La ☑ Mk ☑ Nl ☑ 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 Dual Agg. Bit Rate (Mbits/sec) 512	Full Polarization Pulsar Gate Correlator Passes 1 Integration Period (sec) 0.25 Spectral Points /BBC 128 No of Fields 1

Sources:

Name	Position		Velocity		Group
CentaurusA	**Coordinate System**	Equatorial	**Convention**	Radio	CenA
	Equinox	J2000			
	Right Ascension	13:25:27.61	**Ref. Frame**	LSRK	
		00:00:00.0			
	Declination	-43:01:08.8	**Velocity**	547.12131	
		00:00:00.0			

Sessions:

Name	Session Time (hours)	Repeat	Separation	GST minimum	GST maximum	Elevation Minimum
CenA-H2O	4.00	3	0 day	18:40:00	22:40:00	0

Session Constraints:

Name	Constraints	Comments
CenA-H2O		RMS noise assumes an average of 7 stations on source for 150 minutes. Inflated the EVN calculator sensitivity from 0.29 to 1 mJy due to very low elevation observing. This is based on a 10 MHz wide spectral feature as was seen at ATCA.

Session Source/Resource Pairs:

Session Name	Source	Resource	Time	Figure of Merit
CenA-H2O	CentaurusA	H2O	4.0 hour	1 mJy/bm

Staff support: Friend Plan of Dissertation: no