VLA OBSERVING APPLICATION

A

rcvd:

DEADLINES: 1st of Feb., June., Oct. for next configuration following review
INSTRUCTIONS: Each numbered item must have an entry or N/A
E-MAIL TO: propsoc@nrao.edu (different for some Rapid Response Science)
OR MAIL TO: Director NRAO, 520 Edgemont Rd., Charlottesville, VA 22903-2475

(1) Date Prepared: 06-28-05

(2) Title of Proposal: Discovery of Water Maser Emission in a Distant AGN with the Deep Space Network

(3) AUTHORS (Add * for new location)	INSTITUTION	E-mail	Students Only G/U	For Thesis?	Ph.D. Year
P. T. Kondratko	Harvard University	pkondrat@cfa.harvard.edu	G	Yes	2006
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(4) Related VLA previous proposal number(s): AK579, AK574, AK555, AG636

(5) Contact author
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(7) Scientific Category: ◯ solar system ◯ galactic ⊗ extragalactic ◯ other:
Rapid Response Science: ◯ Known Transient ⊗ Exploratory ◯ Target of Opportunity

(8) Configurations (one per column) (A+Pt, A, B, C, D, BnA, CnB, DnC, Any)	Any				
(9) Wavelength(s) (400, 90, 20, 6, 3.5, 2, 1.3, 0.7 cm)	1.3 cm				
(10) Time requested (hours)	2h				

(11) Type of observation: ⊗ continuum ⊗ spectroscopy ◯ multichannel continuum ◯ polarimetry ◯ solar
(check all that apply) ◯ pulsar ◯ high-time resolution ◯ Pie Town link ◯ other:

(12) Suitable for dynamic scheduling? ⊗ Suitable ◯ Unsuitable

(13) ABSTRACT (do not write outside this space)

Water maser emission currently provides the only means of mapping the morphology of warm dense molecular gas in the inner parsec of active galactic nuclei (AGN). In selected systems, water maser emission traces structure and dynamics of nearly edge-on molecular disks 0.1 to 1 pc from supermassive black holes. The images and spectra of water maser sources obtained with VLBI have been used to infer geometrical shapes and orientations of accretion disks, precisely weigh central black holes, and measure geometric distances. We are currently participating in a high sensitivity, broadband search for new masers with the 70-m Deep Space Network antenna at Tidbinbilla, Australia. We recently discovered water maser emission in a distant ($v_{sys} = 9661$ km s^{-1}) active galaxy AM 2158-380 NED02. We request a 2h VLA snapshot so that we can **1)** corroborate our single-dish discovery, **2)** confirm the association of the discovered maser emission with the AGN, **3)** determine the position of the maser source with sub-arcsecond accuracy necessary for follow-up with the VLBI, and **4)** estimate the level of accompanying continuum emission and search for nearby ($< 1^\circ$) calibrators in preparation for VLBI studies.

NRAO use only
(08/03)

(14) Observer present for observations? ◯ Yes ⊗ No Data analysis at? ⊗ Home ◯ AOC or CV (2 weeks notice)

(15) Help required: ⊗ None ◯ Consultation ◯ Friend (extensive help)

(16) Spectroscopy only	line 1	line 2	line 3	line 4
Transition (HI, OH, etc.)	H_2O			
Rest Frequency (MHz)	22235.08			
Velocity (km/s)	9661			
Observing frequency (MHz)	21518			
Correlator mode	2AC			
IF bandwidth(s) (MHz)	6.25			
Hanning smoothing (y/n)	n			
Number of channels per IF	64			
Frequency Resolution (kHz/channel)	97.656			
Rms noise (mJy/bm, nat. weight., 1 hr)	2			
Rms noise (K, nat. weight., 1 hr)	$\times 10^{-4}$			

(17) Number of sources:	**1**

(If more than 10 please attach list. If more than 30 give only selection criteria and LST range(s).)

(18) NAME	Coordinates 1950 ◯ 2000 ⊗ RA hh mm Dec. ± xx.x°	Conf.	λ (cm)	Corr. mode	Band-width per IF (MHz)	Total Flux (Jy)*	LAS	Required rms (mJy/bm)	Required dynamic range	Time request (hr)
AM2158-380	22 01, -37.8	Any	1.3	2AC	6.25	0.05	$\sim 0.01''$	2	10	2

*For spectral line, this should be the total flux at the peak of the line

Notes to the table (if any):

(19) Restrictions to elevation (other than hardware limits) or HA range (give reason):
Because of the low declination of the target source,
we request to conduct the observations as close to transit as possible.

(20) Preferred range of dates for scheduling (give reason):
As we hope to submit the results of the DSN survey for publication in July,
we politely request prompt scheduling.

(21) Dates which are not acceptable:

(22) Special hardware, software, or operating requirements: N/A

(23) Please attach a self-contained Scientific Justification **not in excess of 1000 words.** (Preprints or reprints will be ignored.)

Please include the full addresses (postal and e-mail) for first-time users or for those that have moved (if not contact author).

When your proposal is scheduled, the contents of the cover sheets become public information (Any supporting pages are for refereeing only).

v4.2 8/03