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: 2005 January 13

(2) Title of Proposal: A superluminal jet from the supernova remnant Cassiopeia A

(3) AUTHORS (Add * for new location)	INSTITUTION	E-mail	G/U	Students Only: For Thesis?	Students Only: Ph.D. Year
Oliver Krause *	Steward Observatory, USA	krause@as.arizona.edu			
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(4) Related VLA previous proposal number(s):

(5) Contact author for scheduling: Oliver Krause
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(7) Scientific Category: ◯ solar system ⊗ galactic ◯ extragalactic ◯ other:

Rapid Response Science: ◯ Known Transient ⊗ Exploratory ◯ Target of Opportunity

Joint Proposal: ◯ VLA/VLBA ◯ VLA/GBT ◯ VLA/VLBA/GBT

(8) Configurations (one per column) (A+Pt, A, B, C, D, BnA, CnB, DnC, Any)	B				
(9) Wavelength(s) (400, 90, 20, 6, 3.5, 2, 1.3, 0.7 cm)	6/3.5				
(10) Time requested (hours)	12				

(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)

Observations with the Spitzer Space Telescope have identified a remarkable bipolar moving structure emanating from the type II supernova remnant (SNR) Cassiopeia A. Two 24 μm maps obtained with 1 yr time difference show extremely large motions, of order 10 to 20 arcsec, which were independently confirmed by four epochs of ground-based deep K-band images towards the northern lobe of this structure. Assuming the standard distance to the supernova remnant, 3.4 kpc, the observed tangential velocities are at luminal to superluminal speed. They are presumably associated with central activity in the SNR such as a relativistic jet. We propose sensitive continuum maps towards 3 bright regions of the bipolar structure at 3.5 and 6 cm. The detection of non-thermal emission associated with the superluminal infrared filaments would strongly suggest the presence of relativistic particles generated by an energetic jet. If proven, this may have a profound impact on our understanding of the astrophysics in supernovae. For example, relativistic jets in core collapse supernovae are considered as the most likely origin of gamma ray bursts.

NRAO use only
(10/04)

(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.)				
Rest Frequency (MHz)				
Velocity (km/s)				
Observing frequency (MHz)				
Correlator mode				
IF bandwidth(s) (MHz)				
Hanning smoothing (y/n)				
Number of channels per IF				
Frequency Resolution (kHz/channel)				
Rms noise (mJy/bm, nat. weight., 1 hr)				
Rms noise (K, nat. weight., 1 hr)				

(17) Number of sources:	**3**

(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)
Cas A lobe N	23 24, +59.0	B	6/3.5		50		36″/20″	0.05		4
Cas A lobe S	23 22, +58.6	B	6/3.5		50		36″/20″	0.05		4
Cas A jet N	23 24, +59.2	B	6/3.5		50		36″/20″	0.05		4

*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):

(20) Preferred range of dates for scheduling (give reason): Synchronous with *Spitzer* observations in February 2005.

(21) Dates which are not acceptable:

(22) Special hardware, software, or operating requirements:

(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).

v4.3 10/04