



VLA OBSERVING APPLICATION

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

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rcvd:

- (1) Date Prepared: 23 July 2004
 (2) Title of Proposal: HI mapping of the first dark galaxy

(3) AUTHORS (Add * for new location)	INSTITUTION	E-mail	Students Only		
			G/U	For Thesis?	Ph.D. Year
R. F. Minchin	Cardiff University	Robert.Minchin@astro.cf.ac.uk			
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- (4) Related VLA previous proposal number(s):

- (5) Contact author
 for scheduling: Robert Minchin
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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)	D				
(9) Wavelength(s) (400, 90, 20, 6, 3.5, 2, 1.3, 0.7 cm)	20 cm				
(10) Time requested (hours)	5				

- (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)

We have just discovered at 21-cm an object in the Virgo Cluster with a FWHM velocity width of 370 km s^{-1} yet giving off no detectable light to very deep limits. Found at Jodrell Bank and confirmed at Arecibo, it has a size larger than the Arecibo beam (3.6 arcmin) implying a minimum dynamical mass of $2 \times 10^{11} M_{\odot}$ and a mass-to-blue-light ratio of at least 1000. The $2 \times 10^8 M_{\odot}$ of HI yield an HI column density of $5 \times 10^{19} \text{ cm}^{-2}$ averaged over the Arecibo beam. The low baryon to dark matter (10^{-3}) is very puzzling. We request 6 hours of VLA time in D configuration under the Rapid Science system because only so could one map this first starless dark matter halo before late 2005 when D configuration returns. Workers in Cosmology, Galaxy Formation, QSOALs and the ISM (spin temperature) will all be urgently interested in such a map.

(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.)	HI			
Rest Frequency (MHz)	1420.406			
Velocity (km/s)	2000			
Observing frequency (MHz)	1411.0			
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)	0.65			
Rms noise (K, nat. weight., 1 hr)	0.2 K			

(17) Number of sources:	1
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(If more than 10 please attach list. If more than 30 give only selection criteria and LST range(s).)

(18) NAME	Coordinates		Conf.	λ (cm)	Corr. mode	Band- width per IF (MHz)	Total Flux (Jy)*	LAS	Required rms (mJy/bm)	Required dynamic range	Time request (hr)
	1950 <input type="radio"/>	2000 <input checked="" type="radio"/>									
	RA hh mm	Dec. \pm xx.x $^{\circ}$									
VIRGO HI21	12 18, +14.8		D	20	2AC	6.25	18 mJy	15 '	0.29		5

*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):
Higher elevations are preferred due to the need for low noise.

(20) Preferred range of dates for scheduling (give reason): Observations at night are preferred as we are proposing high-sens measurements.

(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).