VSOP PROPOSAL COVER SHEETS

ID :

TR :

SR :

DEADLINE : 17 November, 1995
SEND TO : VSOP SOG, ISAS, 3-1-1 Yoshinodai, Sagamihara, Kanagawa 229, JAPAN

Please read Appendix C of Announcement of Opportunity for details on how to fill in this Cover Sheet.

(1) Date prepared : 8 November 1995

(2) Proposal title : Probing Sub-Parsec Scales in the Active Galaxy MKN 421

(3)	INVESTIGATORS	INSTITUTION
P.I.	S. C. Unwin	Caltech, USA
co-I.	A. E. Wehrle	IPAC/JPL/Caltech, USA
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(4) Principal Investigator (or contact person) details...

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(5) Proposal Abstract :

We propose to image one of the closest active galaxies, the BL Lac object MKN 421, at 5 and 22 GHz, to probe the structure of its jet on scales as small as one light-month. This remarkable object emits TeV $\gamma-$rays, the origin of which is believed to be upscattering caused by ultrarelativistic particles the jet, but the mechanism is in much debate. With VSOP imaging we will study the jet collimation on scales $< 10^{17}$ cm, and constrain the Doppler factor of the bulk motion from structure changes. Theoretical models currently lack measurements of many of the physical parameters of the synchrotron-emitting jet; we can derive many of these using the X-ray flux as a constraint.

(6) Proposal Category (indicate all that apply):

Object type:

☑ AGN, ☐ Masers, ☐ Stellar, ☐ Other :

Experiment type:

☑ Single-observation, ☐ Monitoring, ☐ Polarization,
☐ Time-critical, ☐ Target of Opportunity, ☐ Other :

(7) VSOP spacecraft observing mode (see Section 3 and Table 5 of the VSOP Proposer's Guide):

☑ 2 channel x 16 MHz, 2-bit (Standard mode),
☐ 2 channel x 32 MHz, 1-bit,
☐ 1 channel x 32 MHz, 2-bit

Phase calibration tones:

☑ On (Standard continuum mode),
☐ Off (Standard spectral line mode)

(Include justification of any non-standard choice at (14) below)

(8) Ground radio telescope setup

Polarization :

☑ VSOP Standard (IEEE LCP), ☐ Non-standard :

Recording mode :

☑ As for VSOP spacecraft (Standard), ☐ Other :

(9) Investigator participation in scheduling

☐ PI (or co-I) wishes to participate in scheduling ground radio telescopes
☐ PI (or co-I) wishes to participate in scheduling the space radio telescope

(10) Preferred correlator (see Sections 9.11 and 12 of VSOP Proposer's Guide):

☐ No preference, ☐ Mitaka, ☑ Socorro, ☐ Other :

(11) Preferred post-correlation data analysis location:

☐ Home Institution, ☐ Mitaka, ☑ NRAO AOC, ☐ JIVE, ☐ Other

(12) Post-correlation data analysis assistance required:

☐ None, ☑ Consultation, ☐ Extensive help

(13) Details of proposed experiments

An 'experiment' is one or more observations of one source in one wavelength band.
A request to observe the same source in all 3 wavelength bands requires 3 columns to be filled in.
To observe the same source at the same frequency multiple times – a 'monitoring experiment' – requires only one column to be filled in.
Number of experiments in this proposal: 3

	Experiment 1	Experiment 2	Experiment 3	Experiment 4
Source name	MKN 421	MKN 421	MKN 421	
RA (hh mm ss.s)	11 04 27.3	11 04 27.3	11 04 27.3	
Dec (dd mm ss)	38 12 32	38 12 32	38 12 32	
J2000 or B1950?	J2000	J2000	J2000	
Observing frequency band (GHz)	5	5	22	
Continuum observations:				
Standard VSOP freq. channels?	☑	☑	☑	☐
Channel A range (MHz)				
Channel B range (MHz)				
Spectral line observations:				
Ch.A spectral line rest freq. (MHz)				
Ch.A LSR velocity (km/s)				
Ch.B spectral line rest freq. (MHz)				
Ch.B LSR velocity (km/s)				
Min. spectral channels per IF channel				
Correlator averaging time (sec)				
FWHM of field of view required (mas)				
No. of correlating passes (if >1)				
Measured total flux density (Jy)	0.6	0.6	0.5	
Measured correlated flux density on > 5000 km baseline (Jy)	0.5	0.5	0.4	
Image RMS needed (mJy/beam)	1.0	1.0	3.0	
Ground Radio Telescopes:				
Preferred choice:				
Number of medium telescopes	10	10	10	
Number of large telescopes	0	0	1	
Suggested array given at Item (14)	☑	☑	☑	☐
Minimum acceptable:				
Number of medium telescopes	4	4	4	
Number of large telescopes	0	0	1	
Suggested array given at Item (14)	☐	☐	☑	☐
Length of observation:				
Preferred length (orbits)	2	2	2	
Minimum acceptable length (orbits)	1	1	1	
Scheduling constraints:				
Preferred P.A. of beam *major* axis (deg)				
'No holes' (u,v) coverage?	☐	☐	☐	☐
Or maximum resolution (u,v) coverage?	☐	☐	☐	☐
Preferred range of dates for scheduling (for monitoring experiments give range for 1st observation only)	97-04-01 to 97-05-31	97-12-01 to 98-03-01	97-12-01 to 98-03-01	to
For monitoring programs:				
Number of observations				
Mean interval (days)				
Acceptable variance from mean (days)				

(14) Additional notes to the scheduler :

Exp 1 and Exp 2: should be scheduled not less than 3 months apart, and not more than 12 months apart. Preferred ground array is VLBA.

Exp 3: should be scheduled as close as possible to either Exp 1 *or* Exp 2, for spectral index determinations. For Exp 3, preferred ground array is VLBA. One large telescope is essential (Effelsberg preferred).

Estimated correlated flux densities at 5 and 22 GHz are derived from modelfits to existing 15 and 43 GHz ground-based data, respectively (*see text*). Figure 2 shows SNR estimate vs. baseline length.

(15) Attach a scientific and technical justification, not in excess of 2 pages of text and 2 pages of figures. Up to one page of (u,v) plots per source may optionally be included. (Refer to the VSOP Announcement of Opportunity for detailed instructions.) Preprints and reprints will not be forwarded to the Scientific Review Committee.

Send two paper copies of the complete proposal to:
VSOP Observing Proposals
VSOP Science Operations Group
Institute of Space and Astronautical Science
3-1-1 Yoshinodai, Sagamihara
Kanagawa 229 JAPAN

In addition, e-mail the completed LaTeX file to submit@vsopgw.isaslan1.isas.ac.jp

Cover Sheets of accepted proposals will be made available to the astronomical community.

Proposals must be received at ISAS by 17 November 1995