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 : 11 November 1995

(2) Proposal title : Sub-milliarcsecond Polarization Structure in the Bent Jets of Gamma-Ray Blazars

(3)	INVESTIGATORS	INSTITUTION
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co-I.	David H. Roberts	Brandeis University
co-I.	John F. C. Wardle	Brandeis University
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(4) Principal Investigator (or contact person) details...

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(5) Proposal Abstract :

We propose to make 5 GHz (polarization-sensitive) and 22 GHz space VLBI observations of four gamma-ray blazars for which we have initiated high-frequency VLBA polarimetry studies. The sharply curving jet features evidenced in lower-resolution VLBI images suggest curving on even smaller scales and the possible existence of a helical jet structure. Combined with resolution-matched VLBA observations, the high-resolution images obtained will have profound implications for the basic arguments associated with the degree of core polarization and comparisons of jet component polarization position angle with local jet direction that have been made on the basis of lower resolution observations. These observations will characterize the existence and nature of jets bending on *micro*arcsecond scales and address the possibility that detection of gamma-rays selects such sources.

(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 : Dual Polarization (LCP+RCP) at 5 GHz only (Standard at 22 GHz)

Recording mode :

☐ As for VSOP spacecraft (Standard), ☑ Other : (2 chan.x16 MHz, 2-bit) **in each poln.**

(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: 8

	Experiment 1	Experiment 2	Experiment 3	Experiment 4
Source name	1633+382	1633+382	0234+285	0234+285
RA (hh mm ss.s)	16 35 15.49	16 35 15.49	02 37 52.41	02 37 52.41
Dec (dd mm ss)	+38 08 04.50	+38 08 04.50	+28 48 08.99	+28 48 08.99
J2000 or B1950?	J2000	J2000	J2000	J2000
Observing frequency band (GHz)	5	22	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)	3.2 Jy (var.)	1.71 Jy (var.)	3.4 Jy (var.)	2.79 Jy (var.)
Measured correlated flux density on > 5000 km baseline (Jy)	2.9 Jy/beam*	1.34 Jy	2 Jy (est.)	2.54 Jy
Image RMS needed (mJy/beam)	<0.2	<0.5	<0.2	<0.5
Ground Radio Telescopes:				
Preferred choice:				
Number of medium telescopes	8	8	8	8
Number of large telescopes	1	1	1	1
Suggested array given at Item (14)	☑	☑	☑	☑
Minimum acceptable:				
Number of medium telescopes	6	6	6	6
Number of large telescopes	1	1	1	1
Suggested array given at Item (14)	☑	☑	☑	☑
Length of observation:				
Preferred length (orbits)	6	5	6	5
Minimum acceptable length (orbits)	4	4	4	4
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)	98-06-01 to 98-06-19	98-06-20 to 98-07-08	96-12-25 to 97-01-03	97-01-04 to 97-01-12
For monitoring programs:				
Number of observations	2	2	2	2
Mean interval (days)	50	15	25	15
Acceptable variance from mean (days)	15	5	5	5

	Experiment 5	Experiment 6	Experiment 7	Experiment 8
Source name	1156+295	1156+295	0804+499	0804+499
RA (hh mm ss.s)	11 59 31.83	11 59 31.83	08 08 39.67	08 08 39.67
Dec (dd mm ss)	+29 14 43.83	+29 14 43.83	+49 50 36.53	+49 50 36.53
J2000 or B1950?	J2000	J2000	J2000	J2000
Observing frequency band (GHz)	5	22	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)	1.5 Jy (var.)	1.37 Jy (var.)	1.2 Jy (var.)	1.32 Jy (var.)
Measured correlated flux density on > 5000 km baseline (Jy)	1.27 Jy/beam*	1.26 Jy	0.6 Jy/beam*	0.48 Jy
Image RMS needed (mJy/beam)	<0.2	<0.5	<0.2	<0.5
Ground Radio Telescopes:				
Preferred choice:				
Number of medium telescopes	8	8	8	8
Number of large telescopes	1	1	1	1
Suggested array given at Item (14)	☑	☑	☑	☑
Minimum acceptable:				
Number of medium telescopes	6	6	6	6
Number of large telescopes	1	1	1	1
Suggested array given at Item (14)	☑	☑	☑	☑
Length of observation:				
Preferred length (orbits)	6	5	6	5
Minimum acceptable length (orbits)	4	4	4	4
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)	97-05-01 to 97-05-15	97-05-16 to 97-06-01	97-03-01 to 97-03-15	97-03-16 to 97-04-01
For monitoring programs:				
Number of observations	2	2	2	2
Mean interval (days)	40	15	40	15
Acceptable variance from mean (days)	10	5	10	5

(14) Additional notes to the scheduler :

-All experiments:
Suggested Preferred Array: VLBA,VLA,EVN; Suggested Min. Acceptable Array: VLBA,VLA

-Exp 1,5,7: 5 GHz correlated flux density values are peak intensity measurements from the VLBI images cited in the scientific justification.
-All 5 GHz observations require observation (approx. half-orbit) of an instrumental polarization calibrator before and after program source observations using the most sensitive baselines available (see justification). This orbit has been included in the preferred length of observation.
-The preferred "range of dates for scheduling" and monitoring details specified above are designed to yield 4 observations of each source within their windows of preferred (u, v)-coverage in the frequency order 5, 22, 22, 5 GHz (i.e., twice at each frequency).
-We expect that considerable consultation with the scheduler will be necessary to adapt and refine the technical and logistical requirements of this experiment to the observational status of the spacecraft as determined after launch (e.g., true orbital elements and polarization characteristics).
-Exp 1,2 fall in the Phase 2 observations according to the nominal orbital elements. They are included here in case the true orbital elements shift the useful (u, v)-coverages into the Phase 1 observations. Exp 3,4 are to take priority over Exp 1,2 if the nominal orbital element condition persists.

(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