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VSOP PROPOSAL COVER SHEETS

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 : 10 November 1995

(2) Proposal title : Multi-wavelength, Polarization-Sensitive Space VLBI of Four Bright Quasars

(3)	INVESTIGATORS	INSTITUTION
P.I.	David H. Roberts	Brandeis University, Waltham, MA USA
co-I.	George Moellenbrock	Brandeis University, Waltham, MA USA
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co-I.	Denise C. Gabuzda	Astro Space Center, Moscow, Russia
co-I.	Leslie F. Brown	Connecticut College, New London, CT USA
co-I.		
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(4) Principal Investigator (or contact person) details...

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(5) Proposal Abstract :

We propose to image in both total intensity and linear polarization the four brightest and best studied quasars 3C 273, 3C 279, 3C 345, and 3C 454.3. Each quasar will be observed twice within the observing windows at each of three frequencies, to look for rapid variations, together with quasi-simultaneous matched resolution observations with the VLBA alone.
These observations will provide images of unmatched resolution and uv plane coverage, and will enable us to explore the innermost parts of relativistic jets. We shall obtain spectra and sizes of the youngest features in the jets, explore the development of ordered magnetic fields through shocks and boundary layer interactions, and search for Faraday rotation and depolarization in the dense ambient gas surrounding the central engine.

(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)

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: 12

	Experiment 1	Experiment 2	Experiment 3	Experiment 4
Source name	3C 345	3C 345	3C 345	3C 273
RA (hh mm ss.s)	16 42 58.8099	16 42 58.8099	16 42 58.8099	12 19 06.6997
Dec (dd mm ss)	+39 48 36.993	+39 48 36.993	+39 48 36.993	+02 03 08.598
J2000 or B1950?	J2000	J2000	J2000	J2000
Observing frequency band (GHz)	5	22	1.6	5
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)	8.5 Jy (var.)	9.5 Jy (var.)	7.9 Jy (var.)	36.7 Jy (var.)
Measured correlated flux density on > 5000 km baseline (Jy)	2 Jy	2.3 Jy	2.1 Jy	3 Jy
Image RMS needed (mJy/beam)	<0.2	<0.5	<0.2	<0.2
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	6	6	6
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)	98-07-02 to 98-07-13	98-07-14 to 98-07-28	98-06-21 to 98-07-01	98-04-28 to 98-05-14
For monitoring programs:				
Number of observations	2	2	2	2
Mean interval (days)	40	15	60	45
Acceptable variance from mean (days)	7	6	10	10

	Experiment 5	Experiment 6	Experiment 7	Experiment 8
Source name	3C 273	3C 273	3C 279	3C 279
RA (hh mm ss.s)	12 19 06.70	12 19 06.70	12 56 11.17	12 56 11.17
Dec (dd mm ss)	+02 03 08.60	+02 03 08.60	-05 47 21.52	-05 47 21.52
J2000 or B1950?	J2000	J2000	J2000	J2000
Observing frequency band (GHz)	22	1.6	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)	32 Jy (var.)	50 Jy (var.)	13 Jy (var.)	17.4 Jy (var.)
Measured correlated flux density on > 5000 km baseline (Jy)	4.72 Jy	1.5 Jy	5 Jy	8.83 Jy
Image RMS needed (mJy/beam)	<0.5	<0.2	<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	6	6	6
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)	98-05-15 to 98-05-28	98-04-11 to 98-04-27	98-04-28 to 98-05-14	98-05-15 to 98-05-28
For monitoring programs:				
Number of observations	2	2	2	2
Mean interval (days)	15	85	45	15
Acceptable variance from mean (days)	6	15	10	6

	Experiment 9	Experiment 10	Experiment 11	Experiment 12
Source name	3C 279	3C 454.3	3C 454.3	3C 454.3
RA (hh mm ss.s)	12 56 11.17	22 53 57.75	22 53 57.75	22 53 57.75
Dec (dd mm ss)	-05 47 21.52	+16 08 53.56	+16 08 53.56	+16 08 53.56
J2000 or B1950?	J2000	J2000	J2000	J2000
Observing frequency band (GHz)	1.6	5	22	1.6
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)	10.9 Jy (var.)	15.9 Jy (var.)	11.7 Jy (var.)	13.9 Jy (var.)
Measured correlated flux density on > 5000 km baseline (Jy)	3.7 Jy	4 Jy	4.29 Jy	3.4 Jy
Image RMS needed (mJy/beam)	<0.2	<0.2	<0.5	<0.2¡
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	6	6	6
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)	98-04-11 to 98-04-27	00-07-29 to 00-08-15	99-11-05 to 99-11-20	99-12-01 to 99-12-15
For monitoring programs:				
Number of observations	2	2	2	2
Mean interval (days)	85	50	15	200
Acceptable variance from mean (days)	15	10	5	20

(14) Additional notes to the scheduler :

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

-All 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 6-orbit request.
-The preferred "range of dates for scheduling" and monitoring details specified above are designed to yield six observations of each source within their windows of preferred (u, v)-coverage in the frequency order 1.6, 5, 22, 22, 5, 1.6 GHz (i.e., twice at each frequency). (Exp 10,11,12 have their 6 observations distributed over two (u, v)-coverage windows.)
-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 1,2,3 and Exp 10,11,12 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.

(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