VSOP AO4 PROPOSAL COVER SHEETS

DEADLINE : 2 October, 2000
SEND TO : VSOG, ISAS, 3-1-1 Yoshinodai, Sagamihara, Kanagawa 229-8510, JAPAN

(1) Date prepared : 27 September, 2000

(2) Proposal title : The Nuclear Jet in M87

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(5) Proposal Abstract :

M87 is the archetypal extragalactic jet source. Global VLBI observations at 1.6 GHz reveal a complex, limb-brightened jet with *sub*-luminal motions. High-resolution HALCA observations (AO2; March 2000) reveal structures across the jet that have never before been seen in this source (Fig. 1a). In addition, our seven epochs of AO1 and AO2 HALCA observations suggest that the appearance of the jet changes little, if at all, over time. We propose three AO4 epochs. Two of these, if combined, would produce a high-fidelity image with high-resolution both *along* and *across* the jet. It would then be compared to our high-fidelity March 2000 image to check for changes. If none are found, the data from AO1, AO2, and the proposed AO4 would be combined to fill in the holes in the (u,v)-plane and produce a truly spectacular final image. We also propose continued 5 GHz observations to combine with archival HALCA data.

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

Object type:

☑ AGN, ☐ Maser, ☐ Stellar, ☐ Pulsar, ☐ Other :

Observation type:

☑ Continuum, ☐ Spectral Line, ☐ Polarization, ☐ Time critical,
☐ Phase-reference, ☐ Other :

(7) Number of proposed experiments

An 'experiment' is one or more observations of one source at a fixed HALCA set-up. A request to observe the same source at 1.6 GHz and separately at 5 GHz requires two columns to be filled in in item (8) below. A request to observe the same source with HALCA simultaneously observing at 1.6 GHz and 5 GHz requires one column to be filled in. Multi-epoch observations of the same source at the same frequency – a 'monitoring experiment' – requires only one column to be filled in. Suggested observing dates, especially for for time-critical and monitoring experiments, should be specified in item (11).

The number of experiments in this proposal is: 1

(8) Details of proposed experiments

	Experiment 1	Experiment 2	Experiment 3	Experiment 4
Source name (J*hhmm*±*ddmm*)	J1230+1223	J1230+1223		
Alternative name	M87	M87		
RA(J2000) (hh mm ss.ssss)	12 30 49.4230	12 30 49.4230		
Dec(J2000) (dd mm ss.sss)	+12 23 28.000	+12 23 28.000		
Observing frequency band (GHz)	1.6	5.0		
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)				
FWHM of field of view required (mas)				
Min. spectral channels per IF channel				
Correlator averaging time (sec)				
No. of correlating passes (if >1)				
Total flux density (Jy)	3 (nucleus only)			
Correlated flux (mJy)	0.1-0.4			
Ground Radio Telescopes:				
Suggested array given at Item (11)?	☑	☑	☐	☐
GRT observing mode:				
128Mbps LCP (standard)	☑	☑	☐	☐
128Mbps LCP/RCP	☐	☐	☐	☐
256Mbps LCP/RCP	☐	☐	☐	☐
Preferred correlator:				
No preference	☐	☐	☐	☐
Mitaka	☐	☐	☐	☐
Penticton	☐	☐	☐	☐
Socorro	☑	☑	☐	☐
Monitoring programs:				
Number of observations	6-8	6-8		
Mean interval (days)	(see proposal)	(see proposal)		
Related VSOP proposal code(s)	v035, w022a			

(9) VSOP spacecraft observing mode (see Section 3 and Table 2 of the VSOP Proposer's Guide):

- [√] 2 channel x 16 MHz, 2-bit (Standard mode),
- [ ] Other:

Phase calibration tones:

- [√] On (Standard continuum mode),
- [ ] Off (Standard spectral line mode)

(Include justification of any non-standard choice at (11) below)

(10) Assistance with preparation of ground telescope schedule files:

[ ] VSOG assistance requested, [√] Consultation desired, [ ] No assistance required

(11) Additional notes to the scheduler :

The 6-8 observing dates requested are NOT for standard monitoring. We request 2 orbits within a week of each of the following dates: December 26, 2001, June 21, 2002, and December 26, 2002. The June 14, 2001 (u,v)-coverage is not good enough to warrant observation, unless current spacecraft constraints are relaxed. While one orbit per observing epoch is the minimum required, two closely spaced epochs would give us a unique way to assess image fidelity. In addition, two orbits would protect against tracking station failures, which can severely degrade the data. For example, during our AO1 observations we obtained less than 30 minutes of ground-space data because of such a failure. Two orbits for each observing date, we argue, is well worth the time for this extremely important and key source. The recommended ground array is the VLBA plus one or more large radio telescopes (e.g., phased-VLA, DSNs, or Bonn) to help calibration and fringe detection on the longest baselines. Participation of Arecibo would be valuable, but since it cannot track horizon-to-horizon, we need one or more other large telescopes.

(12) Attach a scientific and technical justification, not in excess of 2 pages of text and 2 pages of figures. Refer to the VSOP Announcement of Opportunity for detailed instructions. Preprints and reprints will not be forwarded to the Scientific Review Committee.

EITHER e-mail the completed LaTeX file to submit@vsop.isas.ac.jp and 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 229-8510 JAPAN

OR e-mail the completed LaTeX Cover Sheets file and, in a separate e-mail, the postscript file of the scientific and technical justification, to submit@vsop.isas.ac.jp

Information from the Cover Sheets of scheduled proposals will be made available from the VSOP WWW site.

Proposals must be received at ISAS by 2 October 2000