VSOP AO2 PROPOSAL COVER SHEETS

DEADLINE : 8 May, 1998
SEND TO : VSOG, ISAS, 3-1-1 Yoshinodai, Sagamihara, Kanagawa 229-8510, JAPAN

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

(1) Date prepared : 4 May 1998

(2) Proposal title : The Nuclear Jet in M87

(3)	INVESTIGATORS	INSTITUTION
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(5) Proposal Abstract :

M87 is the architypal extragalactic jet source. Global VLBI observations at 1.6 GHz reveal a complex, limb-brightened jet with *sub*-luminal motions. We propose to use HALCA to image the jet with significantly finer angular resolution than is available with Earth-bound VLBI arrays. We plan to image structures in the jet that are currently unresolved, determine why the "pattern" speed of the jet appears slow ($0.3c$), and increase our understanding of the helical structures within the jet that may reflect (magneto-)hydrodynamic instabilities. A single-orbit observation during AO1 produced fringes out to the extremes of the HALCA orbit and yielded a very interesting map (Fig. 1a). During AO2, we will attempt to combine observations spaced by several months to greatly improve the (u,v)-coverage. The slow variation (< 1 mas y^{-1}) of the jet may make this technique quite powerful.

(6) Proposal Category (indicate all that apply):
Object type:
☑ AGN, ☐ Maser, ☐ Stellar, ☐ Pulsar, ☐ Other :
Observation type:
☑ Continuum, ☐ Spectral Line, ☐ Polarization, ☐ Time-critical, ☐ 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 (10).

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			
Alternative name	M87			
RA(J2000) (hh mm ss.ssss)	12 30 49.423			
Dec(J2000) (dd mm ss.ssss)	+12 23 28.00			
Observing frequency band (GHz)	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) 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 (v035)			
Ground Radio Telescopes: Suggested array given at Item (10)?	☑	☐	☐	☐
GRT observing mode: 128Mbps LCP (standard) 128Mbps LCP/RCP 256Mbps LCP/RCP	☑ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐	☐ ☐ ☐
Preferred correlator: No preference Mitaka Penticton Socorro	☐ ☐ ☐ ☑	☐ ☐ ☐ ☐	☐ ☐ ☐ ☐	☐ ☐ ☐ ☐
Monitoring programs: Number of observations Mean interval (days)	8 (see proposal)			
Related AO1 proposal code(s)	v035			

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

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

Phase calibration tones:

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

(Include justification of any non-standard choice at (10) below)

(10) Additional notes to the scheduler :

The 8 observing dates requested are NOT for standard monitoring. We request 2 orbits each near February 24, April 24, June 24, and Dec 21, 1999. For this slowly varying jet, we will try combining data over the period of AO2 in order to greatly improve the (u,v)-coverage. The two month intervals in the spring of 1999 allow the orbit to change such that (u,v)-coverages sample different position angles. The December date provides N-S (u,v)-coverage to complement the spring data.

While one orbit per observing epoch is the minimum required, ground tracking station failures can severely degrade the data. For example, during our AO1 observations we obtained less than 30 minutes of data because of such failures. Thus, we request 2 orbits for each observing date, which 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 (eg, phased-VLA, DSNs, Bonn, or Arecibo) to help calibration and fringe detection on the longest baselines.

(11) 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 229-8510 JAPAN
In addition, e-mail the completed LaTeX file 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 8 May 1998