

KVN and VERA Array (KaVA) Observations of Bright AGN Jets

NIINUMA, K.
(Yamaguchi University)

LEE, S. S., KINO, M., SOHN, B.W.
(Korea Astronomy and Space Science Institute)

On Behalf of KaVA AGN Sub Working Group/KaVA Science Working Group
(http://kava.kasi.re.kr/kava_main.php)

KaVA is a VLBI array that combines the Korean VLBI Network (KVN) and the VLBI Exploration of Radio Astrometry (VERA), and its baseline lengths range from 305 to 2270 km. The observing frequencies of 23 GHz and 43 GHz are available. Table 1 summarizes the specifications of each array. As shown in Table 1, each array compensates for the weakness of the other, they are complementary, which makes KaVA a very promising VLBI facility.

Table 1: Brief array specifications of each VLBI facility.

	Array		
	KVN	VERA	KaVA
Baseline [km] (Shortest/Longest)	305 / 476	1019 / 2270	305 / 2270
Fringe spacing [mas] (K-/Q-band)	5.6 / 3.0	1.2 / 0.6	1.2 / 0.6

To evaluate the imaging capability of KaVA for extended sources, we carried out test observations for 4C 39.25 (relatively compact structure), 3C 273 (extended bright knotty jet structure), and M 87 (extended smooth jet structure) at both K-/Q-band with bandwidth of 32 MHz on 2013 April 13 and 14. Only 128 Mbps recording mode (bandwidth of only 32 MHz) allows us to conduct test observations in commissioning phase.

Based on the test observations, we clarified KaVA can achieve the substantially high dynamic range exceeding 1000 for the sources having the extended structures with even the bandwidth of only 32 MHz and the on-source time of an hour, if we perform the observation as covering the spatial frequency uniformly within an hour angle spread of a total observation time of 6–8 h [1]. As shown in Figure 1, an extended jet structure in KaVA images are well reproduced compared with the one in VERA image. The dynamic range derived from KaVA observations is at least three times higher than only VERA observations. This imaging capability of KaVA has a great advantage for the AGN jet science.

Reference

[1] Niinuma, K., Lee, S. S., Kino, M., et al.: 2014, *PASJ*, **66**, 103.

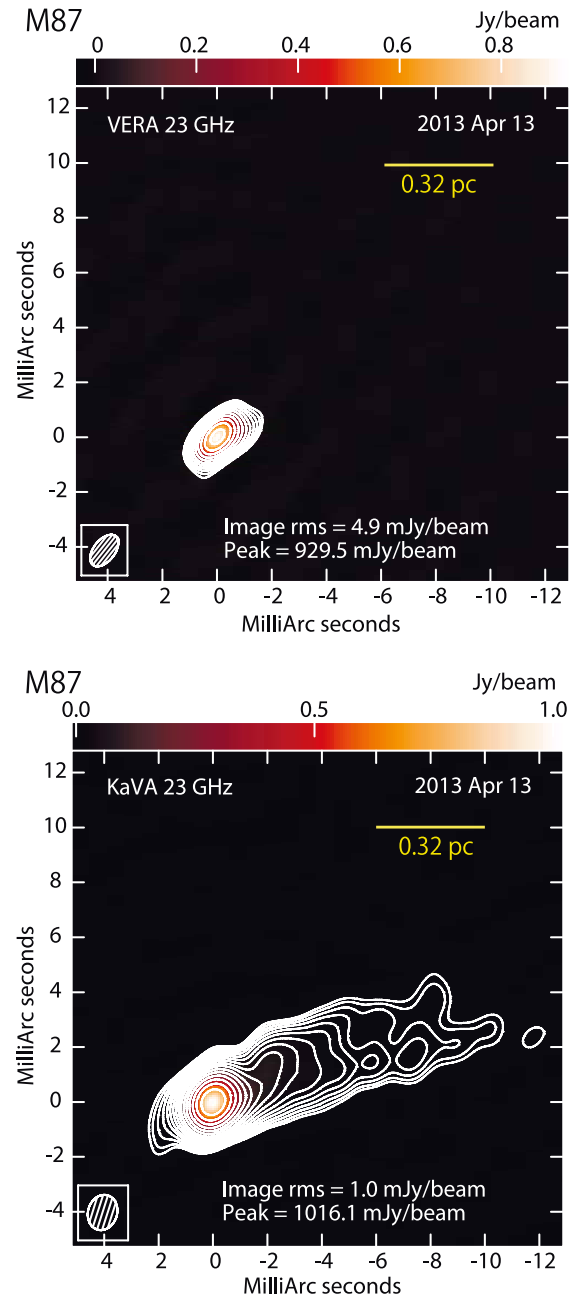


Figure 1: VLBI images of M87 observed by VERA (*top*) and KaVA (*bottom*) at 23 GHz, respectively. In each panel, peak intensities and image noise levels are indicated in the bottom-right corner and synthesized beams are also shown in the bottom-left corner in each image. In the top-right corner, the date and linear scale at the distance of each source are shown. Contours of each image begin at five times of image rms, and increase in $2^{n/2}$ steps.