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Multi-frequency Algorithm at Russian Software Package ASL

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VLA Observation Parameters

Test VLA observations (configuration D) of M87
(*RA=12:28, Dec=12:40*) took place on November
16th, 2005.

- There were 22 antennas enabled.
- Frequency bands: K (*K1=21300, K2=22200, K3=23000, K4=23400 MHz*) и U (*U1=14700, U2=15200 MHz*) Total observation time were 3 hours.

Goals of the VLA Experiment

- Multi-frequency synthesis (MFS) of a M87 at the reference frequency (21.3 GHz) with bandwidth of 8.7 GHz by means of a new class of the multi-frequency imaging (MFI) algorithms developed at ASC.
- Multi-frequency analysis (MFA) of M87. Estimation of a spectral index maps of the source on the same reference frequency.
- Comparison of the obtained results with the existing MFI-technologies at NRAO.
- Investigations of the improvement of image fidelity due to MFS.

Tools

- **NRAO** has used *AIPS* software (*one can find the results of the data processing obtained by L. Kogan on the web site <http://www.aoc.nrao.edu/~lkogan/m87plots.ps>*)
- Astro Space Center (ASC) has used *ASL for Windows* software

MFS Data Processing Steps

(ASL for Windows)

- Maps synthesis by means of self-calibration procedure for all six frequencies (*14665, 15135, 21535, 21965, 22935, 23364 MHz*).
- Synthesis of the image of M87 on the reference frequency (*21535 MHz*) by means of generalized linear multi-frequency deconvolution algorithm.
- Spectral analysis of the image (spectral indexes map, spectrum of different parts of the image of M87).

MFS Image of M87.

CLEAN image (left) and spectral index map (right)

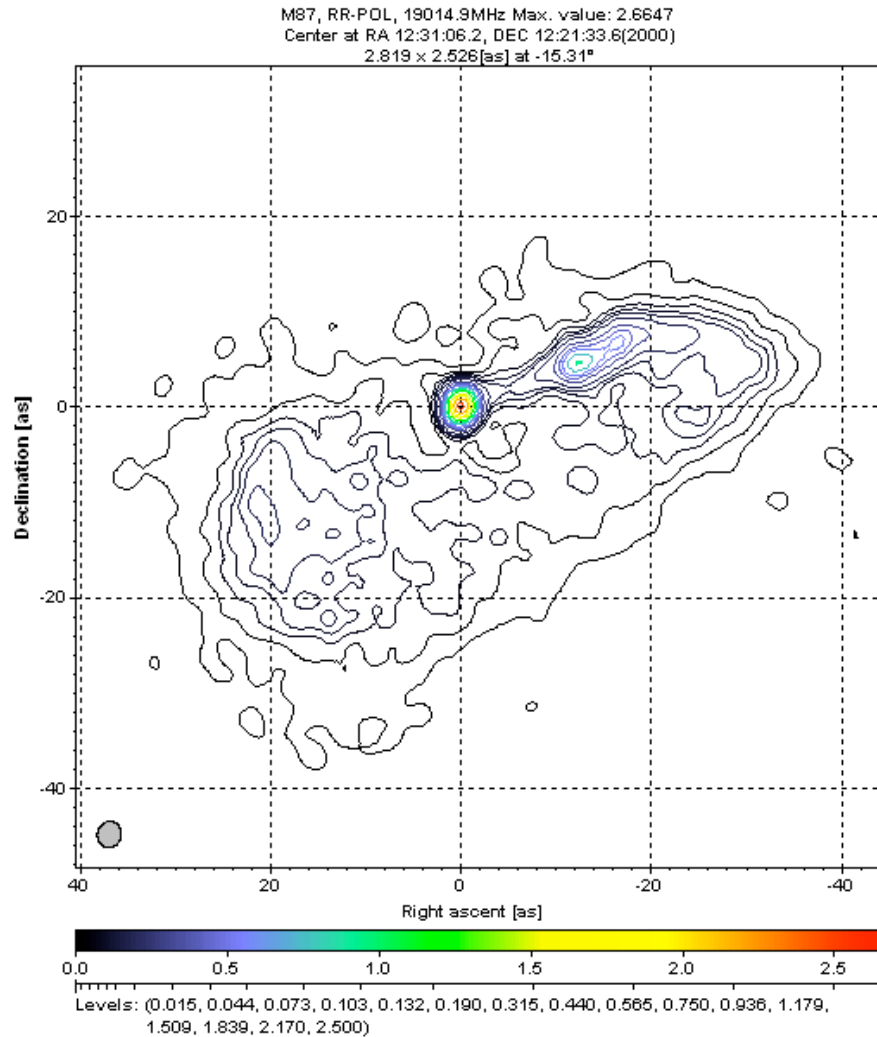


Figure 1

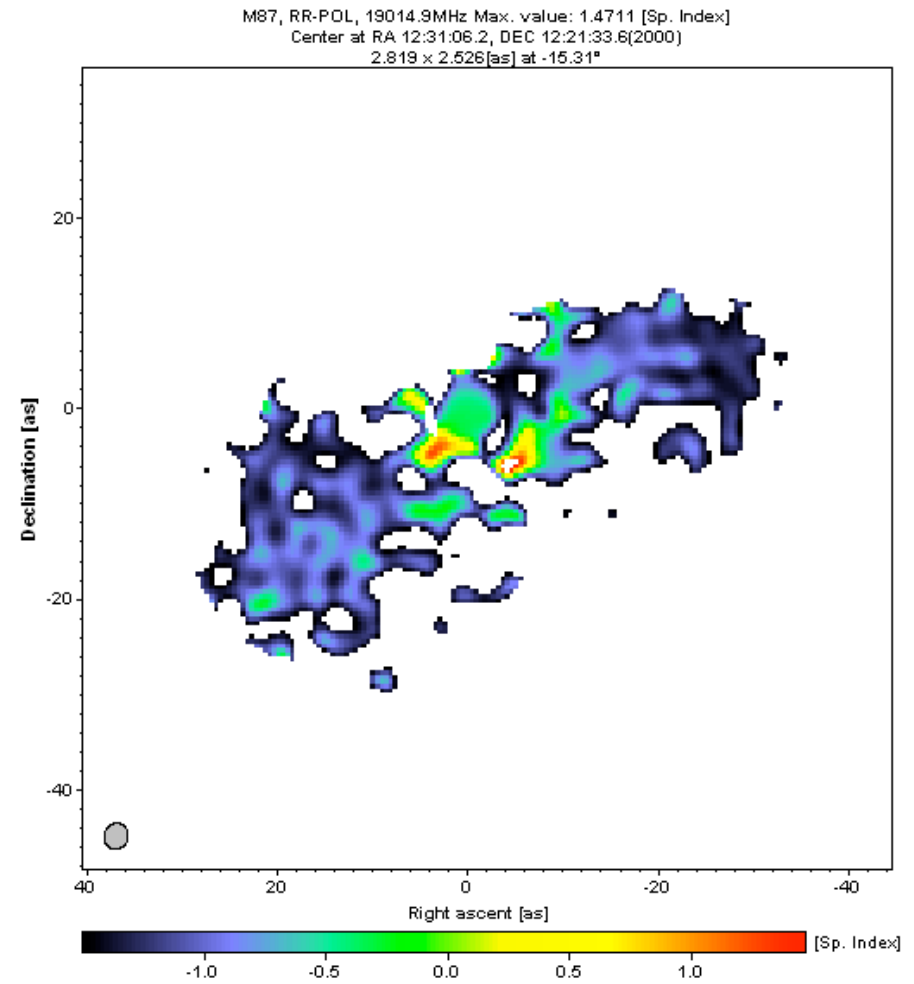
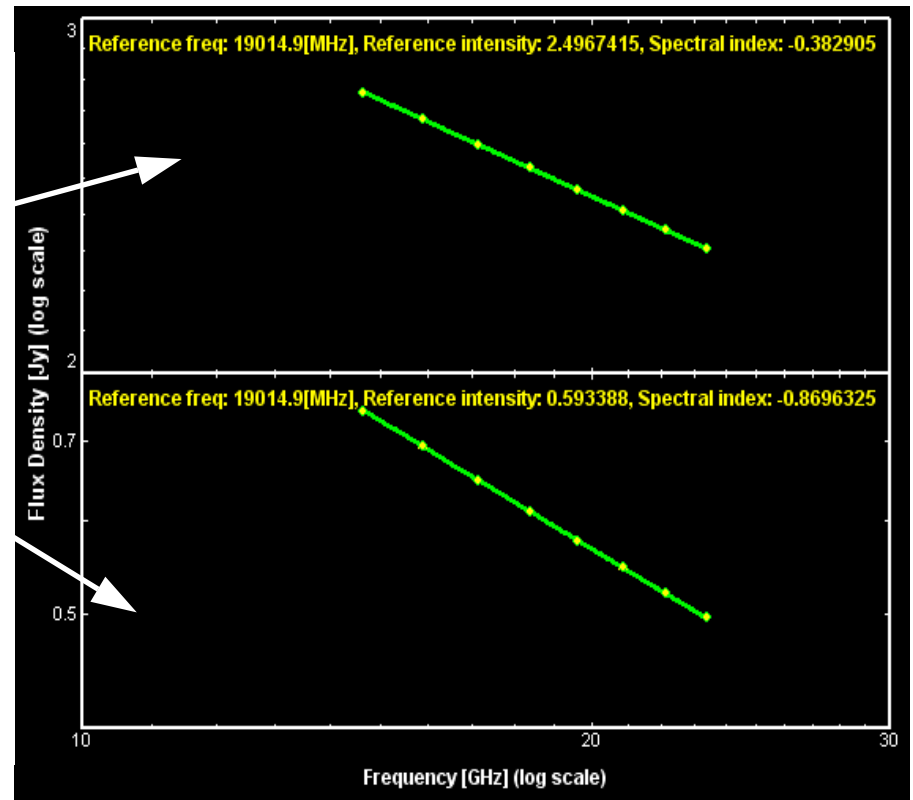
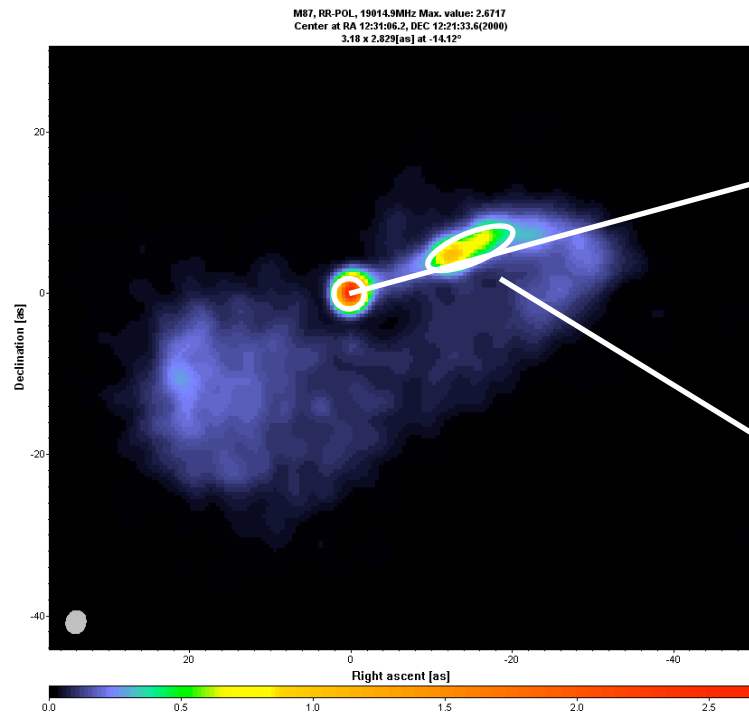
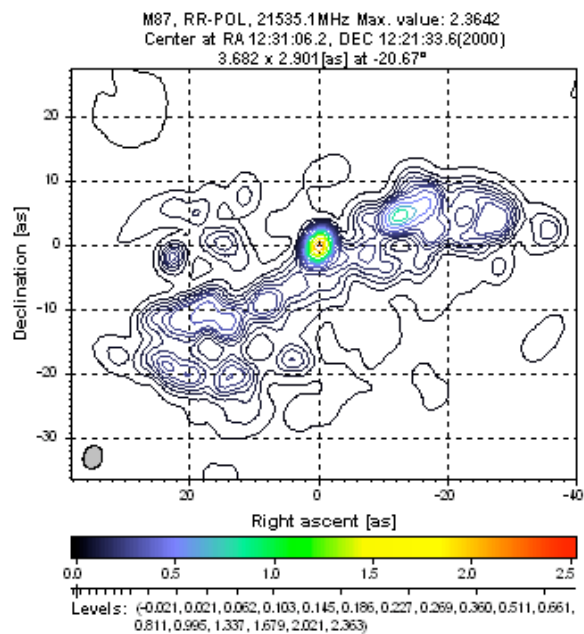


Figure 2

M87. Component analysis





**Figure 1. Image with poor (u,v)-coverage.
FIDELITY = 1183.**

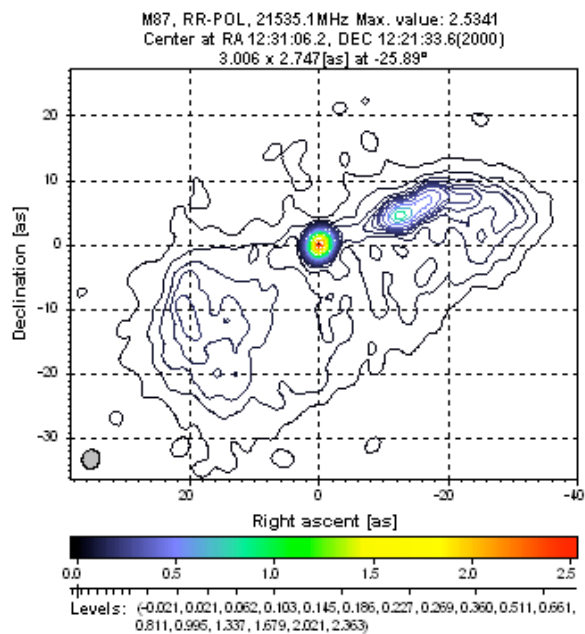
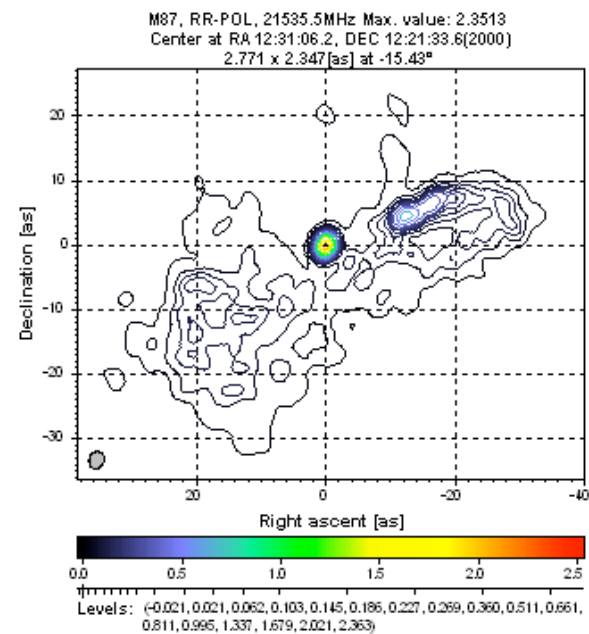


Figure 2. Model image (27 antennas).



**Figure 3. Image with MFS.
FIDELITY = 2461.**

