V35b VLBA Synthesis Imagings of SgrA^* at 43 GHz

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Sagittarius A^* is now the most convincing massive black hole with mass of $3.7\times10^6 M_{sun}$ hidden at the Galactic center. Because of the close location only at 8 kpc from the sun and the quite large mass, SgrA^* has the largest apparent Schwarzschild radius of $6 \sim 9\mu as$. Relativistic phenomena at a few Schwarzschild radii around black hole should be observed in near future VLBI at sub-millimeter wavelength region.

While quite numbers of VLBI observations of SgrA^* have been performed from centimeter to millimeter wave lengths so far and found that the intrinsic image of SgrA^* is blurred by surrounding plasma. It is also notorious that the present VLBI imaging of SgrA^* is quite difficult due to bad atmospheric conditions.

Hence the VLBI investigators of SgrA^* shifted the focus from the synthesis imagings to the analysis using closure phase and amplitude for estimating the size a shape of SgrA^* because those quantities are free from such atmospheric and instrumental variations.

We here present a synthesis imaging method and the resultant images of SgrA^* at 43GHz using the VLBA archival data. Comparisons with the previous estimations using closure amplitude and phase show that mostly the same size and shape of SgrA^* at 43GHz can be obtained from applying Gaussian model fitting and deconvolution of the restoring beam shapes to the obtained synthesis imagings. Super resolution imagings and the Gaussian fittings also give us the similar results though the minor axis becomes 10 % larger. Admitting the bad observational conditions with low elevations and poor u-v, the VLBA imaging of SgrA^* at 43 GHz can be obtained with a certain reliability.