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Measuring the Core Shift of Sgr A*

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The Galactic center, Sagittarius A* (Sgr A*), is the closest supermassive black hole (SMBH) and provides a great opportunity to study the origin of mm/sub-mm emission. Currently, two competing models have been suggested: the base of the jet and a radiatively inefficient accretion flow (RIAF). Measuring the frequency dependent core shift which the radio core moves toward the central SMBH with increasing frequency when the structure is elongated (e.g., conical jet) is an important tool to test this.

The Korean VLBI Network (KVN) is one of the best VLBI arrays to study the core shift, thanks to its quasi-optics system at four frequencies (i.e., 22 ,43, 86 and 129 GHz) so that it enables to correct the phase of target source at higher frequency using the calibrator's phase at lower frequency, so called source frequency phase referencing (SFPR; Rioja & Dodson, 2011). Then the relative astrometric measurements can be recovered.

We have conducted several observations for Sgr A* using KVN, and found not only the positional shift of its center at different frequencies but also an unexpected systematic phase slope which has not been clearly shown in the higher declination sources. We present our efforts to remove the residual phase trend and to constrain the other positional uncertainties so that we can obtain the intrinsic core shift of Sgr A*.

In addition, we conducted VLBA observations closely scheduled to the event horizon telescope (EHT) observations at 1 mm in April 2018. It aims to measure the core shift in parallel with KVN and compare it with the asymmetric structure of Sgr A* which may be resolved through EHT observations.