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Elucidation of a formation mechanism of a large-scale magnetic structure in the Galactic Center

Abstract

Since the central regions of galaxies, which contain large amount of gas amplifies frozen-in magnetic fields there, the gas dynamics is often controlled by the fields, and thus the magnetic fields are one of fundamental pieces advancing the evolution of such galaxies.
However, few relevant observational studies have been done so far even in the Milky Way's center. Theories and MHD simulations expect the magnetic energy is injected through magnetic loops to gas. On the other hand, so far, two plausible candidates for magnetic loops have been found ~600 pc away from the center of our galaxy.
Through spatial and velocity analyses of the proposed high-resolution HI observations, we will offer crucial evidence for the formation mechanism of the magnetic loops.
Only MeerKAT can undertake this unique study, as the observations require high resolution and large FoV at the same time. Magnetic loops offer large velocity width of gas and consequently star clusters with large velocity dispersion. Therefore, this study will help solve the recent great mystery of astronomy called Magorian relations.