

Mass accretion rate probed by mm/submm polarimetry observation with ALMA and SMA towards M87

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Probing the mass accretion rate onto SMBH has been one of the fundamental quests to understand AGN. However, observational understanding of their accretion flows is very limited, as there is no direct imaging of the accretion flow so far. RM observations at mm/sub-mm wavelength are one of the most powerful methods to derive the mass accretion rate. We conducted ALMA and SMA observations to probe the mass accretion process onto SMBH of M87, which is one of the representative of nearby low-luminosity AGN, and one of two primary targets to image the shadow of SMBH with mm/submm VLBI in near future. As the results, we successfully derived an RM to be order of 10^4 rad m^{-2} for the first time. By adopting a standard formulation between RM and mass accretion rate, we derived that the mass accretion rate onto SMBH of M87 to be $\sim 10^{-5} M_{\text{sun}} \text{ yr}^{-1}$, which is in good agreement with the prediction with radiatively inefficient accretion flow model. This small mass accretion rate would not be sufficient to support large kinematic power attributed with relativistic jet. In addition, future mm/submm VLBI observation in polarimetric model will reveal a spatially resolved structure of the accretion flow.