Title

Spectral evolution properties of transient radio emission from a newly-discovered ·turn-on'' AGN

Abstract

Recent optical and mid-infrared time-domain surveys have led to the discovery of a rare but extremely interesting class transients dubbed as "turn-on" AGNs, which have changed from quasi-quiescent galaxies/LINERs to broad-line AGNs within only months to years. Such a rapid state transformation with dramatic changes in accretion rate provides the unique laboratory to explore the ignition mechanism of accretion onto supermassive black holes, and possibly the mystery of jet formation in AGNs. Despite extensive searches, only two bona fide "turn-on" AGNs have been reported so far. By analyzing the VLA, GMRT and VLBA follow-up observations, we find unambiguous evidence of radio brightening in one of them, perhaps associated with the formation of jet or outflow at its earliest phase. More importantly, we find dramatic evolution in the radio spectral index at ~1.4-5.5 GHz from rising to steep shape within only ~1.5 years. If confirmed, the transient would be the first "turn-on" AGN with evolved radio emission. Recent VLA/VLBA observations suggest that the radio spectrum will evolve towards lower frequencies with lower flux densities. We hereby request deep MeerKAT observation at U-, L- and S-band to precisely measure the radio spectral slope and its evolution properties. By combining with the pre-existing radio data, the results will allow for inferring the source kinetic energy and expansion velocity, hence testing the scenario of jet or outflow as the origin of transient radio emission.