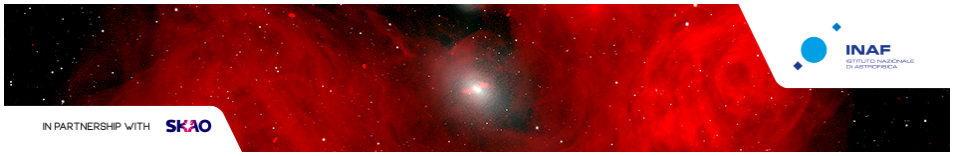

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From cold gas to black hole: the AGN duty-cycle as revealed by MeerKAT

Thursday 30 November 2023 10:40 (20 minutes)

Active Galactic Nuclei (AGN) are one of the prime drivers of galaxy evolution. It is thought they are triggered by the accretion of cold gas from the interstellar medium (ISM) onto the SMBH. Yet, which processes regulate the gas accretion (feeding) onto the SMBH is unknown, as are the processes that alter the physical conditions of the ISM (feedback), and ultimately change the star formation history of the host galaxy. MeerKAT, with its unique combination of long baselines, dense core of antennas and large field of view, is the one and only instrument able to trace the low-column density neutral atomic hydrogen (HI) flowing in and out of galaxies and connect it to the radio emission ejected by the the nuclear activity, from the circum-nuclear scales to the circum-galactic environments. This allows us to identify how AGN change the physical conditions of the ISM, over which timescales, and how the activity is sustained throughout the lifetime of a galaxy.
I will show deep 1.4GHz MeerKAT radio continuum and HI observations of nearby AGN from the large programs MeerKAT Fornax Survey, MHONGOOSE and on-going Open-Time projects. I will focus on powerful radio sources Centaurus A, NGC3100 and Fornax A. In the first, the radio jets are disrupting the HI disk out to its outskirts, where part of the outflowing HI fuels a newly born star forming region. In the latter, I connected the time-scales of the AGN duty-cycle with the fuelling mechanism. While in NGC3100 the nuclear activity is fuelled by HI clouds remnant of a recent interaction, in Fornax A feeding and feedback co-exist in the circum-nuclear regions and self-regulate the rapid recurrent activity. MeerKAT observations of a complete sample of nearby AGN will set the benchmark on studies on the interplay between the cold gas and AGN duty-cycle, until the advent of the SKA.

Reasearch area

HI galaxy science

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