Mining the radio sky towards the earliest AGN

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Motivation

- More than 200 AGN have been observed at z>6 [1]. Detected using data from different wavelengths and varied techniques. A small fraction of them have been identified from radio observations.
- It is anticipated that radio emission can be detected from such early AGN, although its characteristics are still quite indeterminate [2].
- The participation of IA in two projects that use SKA Precursors (EMU, with ASKAP, and MIGHTEE with MeerKAT) creates a remarkable opportunity to apply our research in both projects and, eventually, in SKA.
- We want to understand the properties that make an AGN to be detected as a Radio Galaxy and use these properties to discover new objects with future projects/surveys.

Methods

- AGN data from three major catalogues and individually-studied z>6 sources: SDSS Quasar Catalogue [3], Stripe82 VLA [4] observations and COSMOS Field 3 GHz & 1.4 GHz observations [5, 6].
- More data (several z) obtained using on-line databases (NED, SIMBAD) and cross-matched with our catalogue.
- Initially, we ran some statistical studies to extract possible correlations between observations in different wavelengths.
- Analysed individually measurements and derived quantities (spectral slopes, quotients) in order to understand any behaviour which could help us to extract detection (classification) criteria for Radio Galaxies.

Results

- Full sample shows almost 20 000 sources (0<z<7.5) obtained from different catalogues (shown with different point sizes). Observations of optically-selected high-z sources can go below large surveys’ limits.
- Maximum-volume-weighted luminosity distribution. Sample binned by redshift.
- Mid-IR to X-ray fluxes quotient vs redshift show upper limit for high-z sources.
- Sources from different catalogues show similar behaviour.

Discussion

- Most sources follow main correlations. There are some elements that deviate from the main trends. They might show new properties which can lead to new classification categories.
- There is room to observe and detect sources at intermediate z (4<z<6) in radio bands.

Conclusion

- New correlations can be derived from the use of data from large catalogues and surveys of AGNs.
- Spectral indices can help determining presence of Radio Galaxies.

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