Quantifying the role of environment in triggering AGN activity

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Abstract

The large scale environment is likely to play a key role in the activation and evolution of AGN. Despite significant observational progress however, the link between local density and AGN remains controversial.

I will present new results on the environment of X-ray selected AGN at $z \approx 1$ using data from the Extended Groth strip International Survey (AEGIS), which includes (among others) very deep (200ks per field) wide-area ($0.5\mathrm{deg}^2$) Chandra observations coupled with extensive optical spectroscopy to $R \approx 24$mag. The unique 3-D information over such a large area is exploited to quantify the local density in the vicinity of X-ray sources by measuring the projected surface density of galaxies to the 3rd nearest neighbour.

Initial results provide, for the first time, direct evidence that X-ray selected AGN at $z \approx 1$ avoid underdense regions and share the same rich environment (group or cluster) with luminous red galaxies. Although this is in contrast to the mean local density of optically selected SDSS AGN at $z \approx 0.1$, we argue that the results above can be understood as a consequence of the whereabouts of massive galaxies, capable of hosting supermassive black holes at their centres, with available cold gas reservoirs, the fuel for AGN activity. At $z \approx 1$ an increasing fraction of such systems are found in dense regions. The results above will be discussed in the context of recent AGN formation models, e.g. mergers (Hopkins et al. 2005) and gas infall on the central galaxy of groups and clusters (Croton et al. 2006).