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AGN Clustering and Halo Occupation Distribution from X-ray surveys

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Clustering of AGNs give additional clues to understanding the physical processes of supermassive black hole accretion. The strength of large scale clustering (bias parameter) gives a typical mass of Dark Matter Halos (DMHs) in which the AGN live in. Small scale clustering give additional clues on how the AGNs distribute among DMHs through Halo Occupation Distribution (HOD) modelings. We present the results of our series of AGN clustering measurements using two-point cross-correlation function (CCF) of ROSAT All-Sky Survey/Swift BAT AGNs with galaxy samples and their HOD modelings.

We emphasis on the results of our recent CCF measurements between Swift BAT AGNs and 2MASS redshift-survey galaxies in the local universe (z<0.037) and those between RASS (SDSSIV-SPIDERS) AGNs and BOSS-CMASS galaxies at $z \sim 0.55$. The new results include the findings that: (1) the typical DMH masses from the biases of the local Swift BAT AGNs
($42 \log L_{14-195\mathrm{keV}} < 44$) type 1 and type 2 AGN samples are similar ($M_{\mathrm{DMH}} \sim 10^{13} h^{-1} \mathrm{M}_{\odot}$), which is also close to our previous results for $z \sim 0.3$, $\log L_{\mathrm{X}} \mathrm{erg\,s}^{-1} \sim 44$ RASS AGNs (2) the small scale clustering (the one-halo term regime) is suppressed in the type I AGN only, that may imply that the type I AGN fraction among galaxies decrease with increasing DMH mass, as we found for the $z \sim 0.3$ RASS AGNs. This tendency has not been observed with the type 2 AGN sample.

We also discuss the implications of our results by comparison them with AGNs in cosmological simulations under a few scenarios.

Topic

Active Galactic Nuclei: accretion physics and evolution across cosmic time

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