Astrophysics > Cosmology and Extragalactic Astrophysics

Host Galaxy Properties of the Swift BAT Ultra Hard X-ray Selected AGN

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We have assembled the largest sample of ultra hard X-ray selected (14-195 keV) AGN with host galaxy optical data to date, with 185 nearby (z<0.05), moderate luminosity AGN from the Swift BAT sample. The BAT AGN host galaxies have intermediate optical colors (u-r and g-r) that are bluer than a comparison sample of inactive galaxies and optically selected AGN from the Sloan Digital Sky Survey (SDSS) which are chosen to have the same stellar mass. Based on morphological classifications from the RC3 and the Galaxy Zoo, the bluer colors of BAT AGN are mainly due to a higher fraction of mergers and massive spirals than in the comparison samples. BAT AGN in massive galaxies (log M_*>10.5) have a 5 to 10 times higher rate of spiral morphologies than in SDSS AGN or inactive galaxies. We also see enhanced far-IR emission in BAT AGN suggestive of higher levels of star formation compared to the comparison samples. BAT AGN are preferentially found in the most massive host galaxies with high concentration indexes indicative of large bulge-to-disk ratios and large supermassive black holes. The narrow-line BAT AGN have similar intrinsic luminosities as the SDSS NL Seyferts based on measurements of [O III]. There is also a correlation between the stellar mass and X-ray emission. The BAT AGN in mergers have bluer colors and greater ultra hard X-ray emission compared to the BAT sample as whole. In agreement with the Unified Model of AGN, and the relatively unbiased nature of the BAT sources, the host galaxy colors and morphologies are independent of measures of obscuration such as X-ray column density or Seyfert type. The high fraction of massive spiral galaxies and galaxy mergers in BAT AGN suggest that host galaxy morphology is related to the activation and fueling of local AGN.

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