Suzaku Observations of Heavily Obscured (Compton-thick) Active Galactic Nuclei Selected by Swift/BAT Hard X-Ray Survey

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To reveal the nature of Compton-thick Active Galactic Nuclei (CTAGNs: $\log N_{\rm H}/{\rm cm}^{-2} \geq 24$) is an important, yet unresolved issue in modern astronomy. CTAGNs are key objects to understand the origin of the co-evolution of Supermassive Black Holes (SMBHs) and their host galaxies. According to a galaxy/SMBH evolutionary scenario, major mergers trigger violent star formation and rapid growth of SMBHs heavily obscured by gas and dust. This leads to the idea that some CTAGNs may be distinct populations from less obscured AGNs. However, it remains an open question whether CTAGNs are intrinsically same objects or not as the rest of AGNs due to observational difficulties in detecting CTAGNs.

We present a uniform broadband X-ray (0.5–100.0 keV) spectral analysis of 12 *Swift*/BAT selected CTAGNs observed with *Suzaku*. We fitted these spectra with the Monte Carlo based AGN torus model [1] (Figure 1). The main results are as follows. (1) Unabsorbed reflection components are commonly observed, suggesting that the tori are clumpy. (2) Almost CTAGNs show small scattering fractions implying a buried AGN nature (Figure 2). (3) Comparison with the results obtained for Compton-thin AGNs [2] (Figure 3) suggests that the properties of these CTAGNs can be understood as a smooth extension from Compton-thin AGNs with heavier obscuration [3].

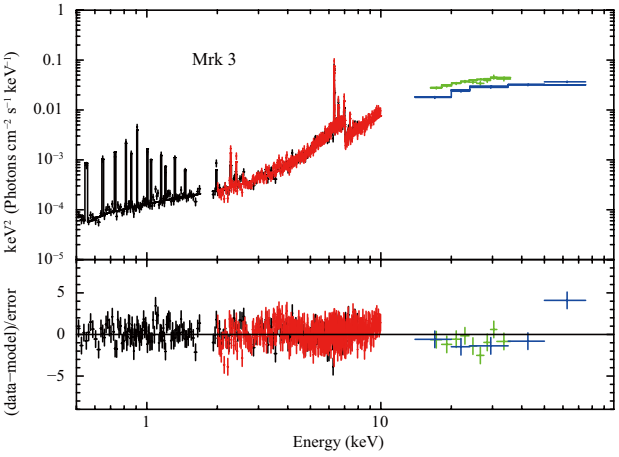

Figure 1: Broadband X-ray spectra. Black and Red: Suzaku/XIS. Green: Suzaku/PIN. Blue: Swift/BAT.

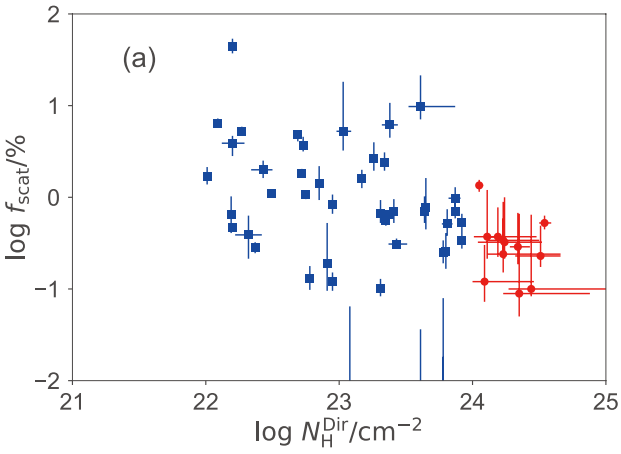

Figure 2: Correlation between hydrogen column density and scattering fraction.

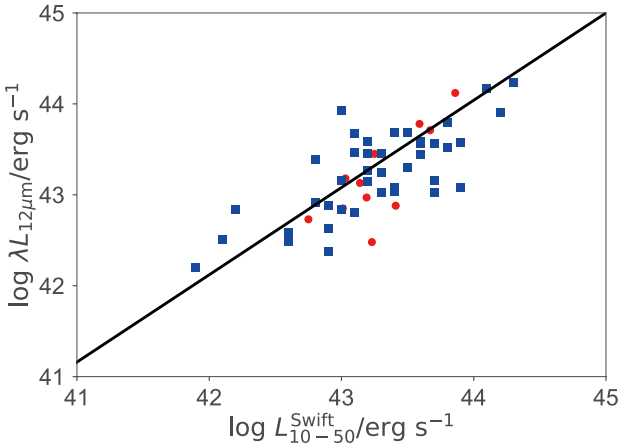

Figure 3: Correlation between the X-ray and infrared luminosities.

References

[1] Ikeda, S., Awaki, H., Terashima, Y.: 2009, *ApJ*, **692**, 608.
[2] Kawamuro, T., et al.: 2016, *ApJS*, **225**, 14.
[3] Tanimoto, A., et al.: 2018, *ApJ*, **853**, 146.