

## The restless nature of AGN: 10 years later



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### On the coronal temperature and its variability

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The hard X-ray emission universally found in AGN is believed to be produced in the so-called corona, of which the physical nature remains unclear. A fundamental parameter is the coronal temperature ( $T_c$ ), which could be measured by fitting the high-energy cutoff ( $E_{\text{cut}}$ ) in the hard X-ray spectra. With multiple NuSTAR observations, we search for the variation of  $T_c/E_{\text{cut}}$  in individual sources. We get a small sample of several sources, which demonstrate an interesting non-monotonic variation pattern, with a break point of the photon index  $\Gamma$  detected. Sources are found to be “hotter-softer-when-brighter” at  $\Gamma < 2.05$ , but turn into “cooler-softer-when-brighter” at  $\Gamma > 2.05$ . Such a behavior indicates that multiple mechanisms, for instance, changes of the coronal geometry and the cooling efficiency, are contributing to the X-ray variability in AGN. Meanwhile, we are also interested in how  $T_c/E_{\text{cut}}$  differs from one source to another. We measure the  $T_c/E_{\text{cut}}$  in a large sample and investigate the correlations between  $T_c$  and other parameters (photon index  $\Gamma$  and Eddington ratio). A strong positive correlation between  $T_c$  and  $\Gamma$  is detected, while none between  $T_c$  and Eddington ratio. In other words, counter-intuitively, hotter coronae tend to produce softer spectra, while the accretion rate is not a primary determinant of the coronal temperature.

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