

The restless nature of AGN: 10 years later



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The Optical-to-X-ray continuum variability of AGN: thermal fluctuation rather than reprocessing?

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From optical to X-ray, the variable continuum emissions of AGN are generally found to be correlated with variations at longer wavelengths lagging the shorter ones. Both the correlation and the lag-wavelength relation are usually understood within the widespread X-ray reprocessing scenario. However, both of them do not always preserve and challenge the reprocessing scenario. In recent years, we (Cai et al. 2016, 2018, 2020) upgrade the inhomogeneous thermal fluctuation model proposed by Dexter & Agol (2011), by introducing a common larger-scale fluctuation (as a result of the propagation and mixing of local fluctuations, likely, by magnetic fields all over the accretion disk) and suggesting a new origin for the continuum lag (as a result of the differential regression capability of local fluctuations responding to the large-scale fluctuation). Now, the new thermal fluctuation scenario can account for several observational properties of AGN variability, including the correlation and lag across the X-ray/UV/optical and the timescale-dependent color variation, and may shed new light on comprehending the UV/optical continuum variations and the relation to X-ray for AGN.

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