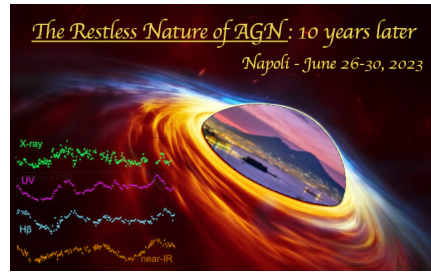


The restless nature of AGN: 10 years later



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Extreme X-ray variability events of a weak-line quasar

We report the discovery of extreme X-ray variability events of the weak-line quasar SDSS J1539+3954 at $z = 1.935$. Before the X-ray flux rise (by a factor of > 20) observed in 2019, SDSS J1539+3954 appeared X-ray weak compared with the expectation from its ultraviolet (UV) flux; after the rise, the ratio of its X-ray flux and UV flux was consistent with the majority of the AGN population. A flux drop by a factor of > 9 was observed nine months after the flux rise, and SDSS J1539+3954 became X-ray weak again. The HET spectra of SDSS J1539+3954 that are taken contemporaneously with X-ray observations show that its UV continuum level remains generally unchanged despite the dramatic variation in the X-ray flux, and its C iv emission line remains weak. The dramatic change only observed in the X-ray flux is consistent with a shielding model, where a thick inner accretion disk can block our line of sight to the central X-ray source. This thick inner accretion disk can also block the nuclear ionizing photons from reaching the high-ionization broad emission-line region, so that weak high-ionization emission lines are observed. Under this scenario, the extreme X-ray variability events may be caused by slight variations in the thickness of the disk across our line of sight.

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