



X-RAY ASTRONOMY 2019

Current Challenges and New Frontiers in the Next Decade

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A tidal disruption event in an AGN

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We report the discovery of a Tidal Disruption Event (TDE) occurred in the Active Galactic Nuclei. The X-ray spectral properties and the broad optical emission lines detected in the SDSS spectrum clearly revealed the AGN nature, with black hole mass of $\sim 10^6 M_{\odot}$ and Eddington ratio of $\lambda_{Edd} = 0.6$. A sudden increase in flux during the second half of 2009 is shown in the long-term optical, UV and NIR light curves. After an initial decline, a plateau phase evidently emerged in the NUV and optical $\{u, g, r, i\}$ light curves. The plateau phase in the NUV band is likely lagged behind the optical ones by approximately 70–80 days with also a much shorter duration, i.e. $\sim 7\text{--}15$ days against $\sim 40\text{--}50$ days. The long-term light curves in the NUV and optical bands (after the plateau phase), as well as in the infrared band (*mission*{VISTA} NIR and *mission*{WISE} MIR), can be well fitted with a power-law with the form $f(t) = A * (t - t_0)^{-\beta}$. The value of β depends on the wavelength band, with $\beta \sim 0.7\text{--}1.0$ in the NUV/optical bands, $\sim 2.1\text{--}2.7$ in the NIR $\{J, H, K_S\}$ bands, and $\sim 1.2\text{--}1.4$ in the MIR bands. The characteristics of the long-term multi-band light curves suggest that the observed increase in multi-band flux are caused by a TDE. The difference in the β value for different bands may indicate that the radiation in the optical/UV, MIR and NIR are from distinct regions which is in agreement with the scenario that the NIR and MIR flares are the echoes of the primary optical/UV emission. The lag between the NUV and optical plateau phase and the duration of the plateau phases, may imply that the optical/NUV flares are originated from the accretion disc. The plateau phase can be due to viscosity decay after the stellar debris interacting with the accretion disc of AGN, while the lag can be explained with the viscosity time-scale.

Topic

Multi-messenger and transient astronomy

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