Outflows from super-Eddington accretion in V404 Cyg

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Abstract

The black-hole binary V404 Cyg entered the outburst phase in June 2015 after 26 years of X-ray quiescence. We observed the entire outburst with the Swift satellite and performed time-resolved spectroscopy of its most active phase, obtaining over a thousand spectra with exposures of few tens of seconds. In this contribution I will present the results of the spectral modeling on behalf of a larger team.
We find that the spectra can be fitted with an absorbed powerlaw model, which most of the time required the presence of a partial covering. An iron line and reflection features appears in 10-20% of the spectra together with the signature of high column densities. None of the spectra showed the unambiguous presence of soft disk-blackbody emission.

The results can be explained assuming that the inner part of the accretion flow is inflated into a slim/thick disk that both hides the innermost (and brightest) regions of the flow, and produces a cold, clumpy, high-density outflow that introduces the high-absorption and fast spectral variability observed. The largest flares produced by the source might have been solely caused by the occasional unveiling of the bright central parts of the accretion flow.
We argue that the black hole in V404 Cyg likely accreted continuously at Eddington/super-Eddington rates, while being partly or completely obscured by the inflated disk and its outflow. V404 Cyg thus seems analogous to the ultra-luminous X-ray sources, where similar physical processes are though to occur, but only viewed at lower inclination angles.

Keywords: Black hole binaries, accretion, outflows, black hole ULX unification

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