Multi-wavelength fast correlated variability during the outburst decay of GX 339-4

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Abstract

We present the results from the first multi-wavelength fast-photometry campaign of a black-hole transient outburst decay. We observed GX 339-4, simultaneously in X-rays and near-infrared, at high time resolution during the OIR re-brightening at the end of its 2015 outburst. We find timing properties that are significantly different from the ones found during the rise of the outburst. The cross correlation function has a strongly asymmetric shape, with the X-rays lagging the infrared, while the phase lags are approximately constant between 0.01 and 1 Hz. The properties of this correlated variability challenge all current models, and suggest that the overall inflow-outflow structure during the outburst decay might be different from that during the rise of the outburst. We also report the detection in the IR Fourier power spectrum of a type-C quasi-periodic oscillation at 0.1 Hz, which is not detected in the X-rays power spectrum. Further IR high time resolution observations taken in the same period, without strictly simultaneous X-ray coverage, reveal that the IR QPO evolves, with a centroid frequency passing from 0.2 to 0.05 Hz in less than a week.

Keywords: jets, outburst decay, multiwavelength variability, fast IR photometry, IR QPO

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