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The accretion flow-discrete ejection connection in GRS 1915+105

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Abstract

© 2016. The American Astronomical Society. All rights reserved.The microquasar GRS 1915+105 is known for its spectacular discrete ejections. They occur unexpectedly, thus their inception has escaped direct observation. It has been shown that the X-ray flux increases in the hours leading up to a major ejection. In this article, we consider the serendipitous interferometric monitoring of a modest version of a discrete ejection described in Reid et al. that would have otherwise escaped detection in daily radio light curves. The observation begins ~1 hr after the onset of the ejection, providing unprecedented accuracy on the estimate of the ejection time. The astrometric measurements allow us to determine the time of ejection as - MJD 56436.274-0.013+0.016, i.e., within a precision of 41 minutes (95% confidence). Just like larger flares, we find that the X-ray luminosity increases in last 2-4 hr preceding ejection. Our finite temporal resolution indicates that this elevated X-ray flux persists within - 21.8-19.1+22.6 minutes of the ejection with 95% confidence, the highest temporal precision of the X-ra--superluminal ejection connection to date. This observation provides direct evidence that the physics that launches major flares occurs on smaller scales as well (lower radio flux and shorter ejection episodes). The observation of a X-ray spike prior to a discrete ejection, although of very modest amplitude, suggests that the process linking accretion behavior to ejection is general from the smallest scales to high luminosity major superluminal flares.

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Keywords

accretion, accretion disks, black hole physics, X-rays: binaries