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Hidden Variability and the Link Between Type-B QPOs and Jet Ejections in Swift J1727.8–1613 and MAXI J1820+070

It is widely accepted that Type-B quasi-periodic oscillations (QPOs) are causally connected to discrete ejections of relativistic jets in black hole X-ray binaries. Here, I present new results from a bright flare of Swift J1727.8–1613, during which the source evolved from the hard intermediate state (HIMS) into the soft intermediate state (SIMS) and almost immediately back to the HIMS, without progressing into the high-soft state (HSS).

During this brief excursion into the SIMS, the broadband X-ray variability drops and discrete, optically thin radio ejections are observed, as typically seen during transitions into the SIMS.

Using a novel joint power and cross-spectrum fitting technique, I show that the Type-B QPO is already present during the HIMS, and hence not physically associated with the discrete jet ejections. Initially, the Type-B QPO is hidden beneath the stronger Type-C QPO and dominant broadband variability. As the Type-C QPO disappears, broadband noise weakens, and the steady compact radio jet vanishes, the Type-B QPO becomes detectable and dominates the variability, and the power spectrum changes from Type-C to Type-B.

These results challenge models that interpret the power spectrum as a single broadband component, favoring instead a picture where distinct variability components coexist, each with their own QPOs. The disappearance of the Type-C power spectrum alongside the steady radio jet suggests a close link between them.

I will present these findings for Swift J1727.8–1613, complemented by results from MAXI J1820+070, and discuss their implications for the structure of variability and the formation of jets in black-hole binaries.

Contribution

Oral talk

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