

A unified accretion-ejection paradigm for X-ray binaries? Application to GX339-4 and LFQPOs

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The hysteresis behavior of X-ray binaries during their outbursts remains a mystery. We have developed a paradigm where the disk material accretes in two possible, mutually exclusive, ways: the usual alpha-disk mode and a jet-emitting disk mode, where magnetically-driven jets carry away mass, energy, and all the angular momentum vertically. I will show how this paradigm can reproduce most spectral states of X-ray binaries, and how we can predict 9 GHz radio fluxes for any given set of jet parameters. Playing on only two parameters, I will show how our model can reproduce all RXTE X-ray spectral shapes and ATCA radio fluxes (9 GHz) from the black hole GX339-4 between 1996 and 2011. This is, to our knowledge, the first time that accretion-ejection cycles have been reproduced using both accretion (X-rays) and ejection (radio) constraints. Moreover, we have addressed the production of low frequency quasi-periodic oscillations (LFQPO) during the outbursts and showed impressive correlation with our disk structure. At the light of these results, I will discuss the concurrence of our model with the most prominent mechanism of production of LFQPO: the Lense-Thirring solid-body precession. All these results can be found in 5 published papers (Marcel et al. 2018a,b, 2019, 2020, 2021).