Qeios

Peer Review

Review of: "Time-Resolved Hubble Space Telescope UV Observations of an X-Ray Quasi-Periodic Eruption Source"

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This paper presents a detailed analysis of the newly discovered QPE source eRO-QPE2, providing strong constraints on its accretion disk properties, orbital parameters of the secondary, and eruption mechanism. The authors propose a disk-orbiter interaction model, where a compact companion perturbs a small accretion disk, producing quasi-periodic eruptions, and rule out AGN-driven accretion instabilities.

The paper presents thorough work, leveraging multi-wavelength data, spectral modeling, and variability studies. However, I had a few concerns, which I list below.

The paper primarily focuses on a standard thin disk interpretation, but it is not adequately clear why alternative models such as radiatively inefficient accretion flows (RIAFs) were not considered, especially given the low inferred accretion rate. One plausible reason for not using alternative models could be the lack of X-ray variability, but it is not sufficiently clear from the paper. Therefore, it would have been insightful to have a discussion of whether RIAF-like solutions (e.g., an advection-dominated accretion flow, ADAF) could fit the data or not.

The paper does not adequately discuss the choice of priors (uniform or log uniform). Moreover, it is not sufficiently clear if spectral fitting was checked for plausible degeneracies. Degeneracies between disk inclination and inner accretion disk radius may affect the inferred black hole mass, which is unusually low for QPEs. One approach could be, instead of choosing between a RIAF or a thin disk, to consider fitting a hybrid disk+RIAF model where the inner region is hot (RIAF) and the outer region follows a standard disk profile. Performing time-resolved spectroscopy may be helpful for examining

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spectral evolution over time and to check for a transition from a standard thin disc to a RIAF or vice versa.

Declarations

Potential competing interests: No potential competing interests to declare.