

Peer Review

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

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1. Independent researcher

Report on Time-resolved HST UV observations of an X-ray QPE source

This paper discusses the highest sensitivity UV observations of a QPE source taken to date. It demonstrates that QPEs, or at least those of eRO-QPE2, occur in a small accretion disc, consistent with being produced by a recent Tidal Disruption Event but inconsistent with a persistently-accreting AGN. The UV emission shows no variations simultaneous with the X-ray QPEs down to a limit of a few $\times 10^{40}$ ergs/s, a factor 1-2 orders of magnitude fainter than the X-ray flares. The presented results are consistent with QPEs generated by the collision of an orbiter with an accretion disc but do not support models based on disc instabilities.

General:

The paper is well written and gives a useful confirmation of the mainstream theory of QPEs, while rejecting some alternative models. I have only minor comments.

- The error bars seem to be corrupted on the Eddington ratio in the abstract and in a few places in Table 1.
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- In Section 3.1, the line "These results are consistent with the absence of broad emission lines in optical spectroscopy as well as an X-ray corona and an IR bright torus-like structure, indicating that no mature broad line region is present" is a bit hard to follow. Are you saying that the lack of an X-ray corona (and the lack of an IR torus) makes it unlikely that this is a persistent AGN because AGNs always have these features? It could do with clarifying.
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- At the end of Section 3.2, can you say whether the Ultraviolet Explorer mission will have the spatial resolution necessary to detect low-luminosity variations from QPEs without being overwhelmed by the stellar emission from the host galaxy?
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- In Fig. 4 - there is a lot going on in the bottom right panel, and it would benefit from a clearer description in the caption and text. If I understand the panel correctly, then the caption should say something like: "A grid of stellar mass against orbital distance from the black hole in units of the measured orbital radius. The green line represents the tidal disruption radius, the area below this line is excluded. The area between the green and blue lines represents parameter space where mass transfer may occur, which is limited to stars with >0.25 solar masses. The (MS) stellar mass cannot exceed 1 solar mass, as this would lead to a full tidal disruption."
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- For further clarity, you could shade in the area of the panel which does give an allowed solution, perhaps with different colour shading for the parameter space involving mass transfer and the part where no transfer would occur.
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- Can you give a reference for the limitation on Roche-lobe overflow for low mass stars?

Declarations

Potential competing interests: No potential competing interests to declare.