Qeios

Peer Review

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

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The manuscript explores the UV properties of the X-ray QPE source eRO-QPE2 through coordinated XMM-Newton and HST observations. The authors found a very weak UV source (L_{FUV} ~ 10^{41} erg/s) which does not follow the X-ray timing behaviour within the statistics allowed by the UV data.

The authors then systematically explore plausible scenarios for X-ray QPE behaviour and through it the likely nature/origin. They rule out a nuclear star cluster origin and explore accretion disk spectral modelling for UV to X-rays and infer an accretion disk size that is much shorter than typically found in AGN but consistent with those inferred for TDEs (stellar). Following this, orbiter scenarios were explored within the information. Based on these analyses, the authors disfavor the “no accretion disk” scenario as well as the normal AGN accretion disk.

The article provides a sufficiently detailed analysis and comparative analysis of the enigmatic QPO source. I have only minor suggestions, mainly from a clarity point of view (listed below).

Minor Issues:

1. Figure 3: Since neither the data points nor the model curves exceed 10^{43} on the y-scale, it would be better to limit the y-scale to 10^{43} and remove the white (unused) spaces. This will make the plots clearer and easier to follow.

2. Introduction, Page 1: Though the introduction is sufficient when considering the results of the manuscript, it would be good to include a short paragraph on the source and its studies. This will help beginners and, to a good extent, even experts, realize the context and importance/potential.

3. §2.4: I am not sure what the authors exactly meant by the statement “*.. the spatial resolution of the MUSE spectra is 0.7″* (250 pc physical scale) i.e. much larger than the HST data used here. It’s comparing MUSE

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resolution to HST data. I believe the authors meant HST resolution here. If so, it would be good to make it clear for the benefit of the readers.

4. §2.4: It is also not clear how the authors got the total mass "*NSC mass of log10(MNSC) 7.8 (6.4) M⊙*". Is it scaling (linear or what kind?) or by fitting as in the cited reference?

5. Abstract: The upper limit of the error on the Eddington Ratio is missing in the Abstract.

Declarations

Potential competing interests: No potential competing interests to declare.