QPOs from misaligned accretion discs

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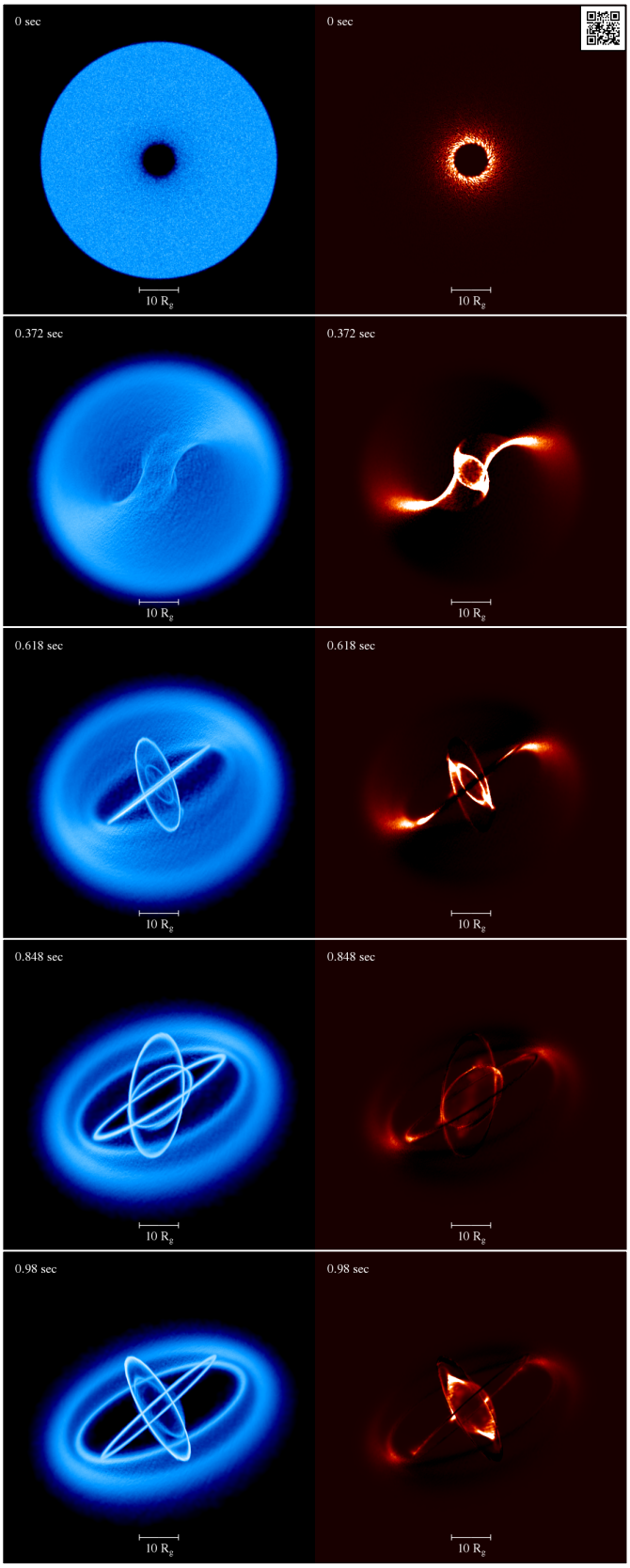
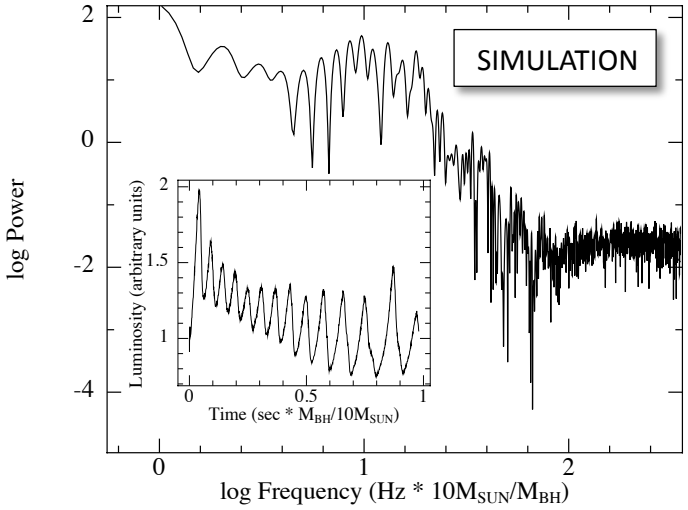


Density (blue) and luminosity (red) of a simulated accretion disc inclined at 60°.

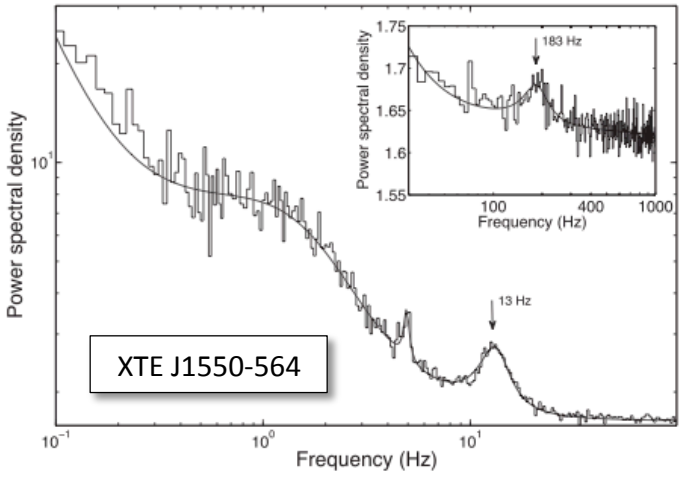
We present a physically motivated model where quasi-periodic oscillations are driven by Lense-Thirring precession.

Recent SPH simulations have shown when the disc is inclined to the spin of the black hole, it can be ripped up into rings that precess effectively independently (e.g. Nixon et al. 2012, Nealon et al. 2015). These rings occur at ~5-20R_g (see example, left), where QPOs are expected to be sourced. Here we show that these rings produce frequencies that are comparable to observed LF QPOs.

We simulate a disc with parameters similar to the black hole candidate XTE J1550-564 and estimate the energy liberated by shock heating and compressive work (see insert and left) to produce a simulated lightcurve.



The power spectrum calculated from the resulting lightcurve identifies power at ~10Hz (above), comparable to observations (below, Figure 1 Motta et al. 2014).



This work was performed on the gSTAR national facility at Swinburne University of Technology. gSTAR is funded by Swinburne and the Australian Government's Education Investment Fund.