Analysis of quasi-periodic oscillations at the propeller stage

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Axisymmetric magnetohydrodynamic (MHD) simulations of disk accreting magnetized stars at the propeller stage have shown some quasi-periodic oscillations (QPOs) of the inner radius of the disk, of the accretion rate at the staraŕs surface, of outflow of matter in form of jets, and of the angular momentum fluxes flowing in or out of the star. These oscillations are related to the configuration and reconnection of the magnetic field. When the accreting matter moves in, the magnetic field lines are compressed and reconnected recurrently which modulates the flow of matter to the star.

We analyzed these oscillations using wavelet techniques and found that they are of low-frequency, of the order of 0.01-0.1 times the stellar spin rate. In most cases, the QPO peak is pretty wide, but in some cases they become well tuned and show sharp peaks. Furthermore, the frequency of oscillations depends on the properties of the star and the disk, such as the magnetic moment, angular velocity, accretion rate and magnetic diffusivity. They will be discussed in the poster in detail.