

Pulse-to-pulse variability of accreting pulsars: two regimes of accretion

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ABSTRACT

The accretion flow in the vicinity of the accretor is generally expected to be highly non-stationary. Although from the theoretical point of view the problem of non-stationary accretion has been addressed by many authors, observational study of this phenomenon is often problematic as it requires very high statistics of X-ray data and a specific analysis technique. In our research we used high-resolution data taken with the modern X-ray satellites, such as RXTE and INTEGRAL, on several brightest transient and persistent pulsars, to perform an in-depth study of their variability on time scales comparable to the pulsation period - "pulse-to-pulse variability". Our approach allowed us for the first time to study the dependence of the pulsar's spectrum on the amplitude of individual pulses. Our results show that the pulsars exhibit two different regimes of accretion distinguished by the different pulse-amplitude dependencies of their spectra which we interpret in terms of different accretion flow structure close to the neutron star surface.