

On the nature of long-period X-ray pulsars

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Several relatively bright, persistent X-ray sources display regular pulses, with periods in the range of 700–10000 s. These sources are identified with massive compact binaries in which a neutron star accretes material onto its surface. The observed pulsations in all of them are unambiguously associated with the spin period of the neutron star. Analyzing possible history of these pulsars I conclude that the neutron stars in these systems undergo spherical accretion and their evolutionary tracks in a previous epoch contained three instead of two states, namely, ejector, supersonic propeller, and subsonic propeller. An assumption about a supercritical value of the initial magnetic field of the neutron stars within this scenario is not necessary. Furthermore, I show that the scenario in which the neutron star in 2S 0114+650 is assumed to be a magnetar descendant encounters major difficulties in explaining the evolution of the massive companion. An alternative interpretation of the spin evolution of the neutron star in this system is presented and the problem, raised by the association of the 10000 s pulsations with the neutron star spin period, is briefly discussed.