

Evolution of binary millisecond pulsars with light companions: the case of PSR J1748-2446ad

L. Burderi (1), F. D'Antona (2), T. Di Salvo (3), A. Riggio (1), N. D'Amico (1)

(1) Università di Cagliari (burderi@mporzio.astro.it), (2) Osservatorio Astronomico di Roma, (3) Università di Palermo

The recently discovered 716-Hz eclipsing binary radio pulsar in the globular cluster Terzan 5 is the fastest spinning neutron star ever found up to date, breaking, after 23 years. PSR J1748-2446ad shows eclipses lasting about 40\% of the orbit, which explains why this system has not been discovered up to now despite the fact that Terzan 5 has been searched for millisecond pulsars since the late eighties. In this paper, we demonstrate that the only possibility to explain this long-lasting eclipses is that PSR J1748-2446 is in a radio-ejection phase, a recently proposed evolutionary stage during which matter leaving the Roche-lobe filling companion cannot accrete onto the neutron star because of the radiation pressure of the millisecond pulsar. This matter is thus ejected from the system and is responsible for the eclipses. As the onset of the radio-ejection phase is almost inevitable if the pulsar is spinning very fast, we expect that the fastest spinning neutron stars are hidden by free-free absorption by the ejected matter, and thus should be searched at high radio frequencies where absorption is less severe.