

The Structure and Signals of Neutron Stars, from Birth to Death



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Formation and evolution of pulsars via the accretion induced collapse of white dwarfs

The Recycling process is usually considered as a standard model to produce Millisecond Pulsars (MSPs). I will discuss another possible channel involving the Accretion Induced Collapse (AIC) of a white dwarf (WD) in binaries. As accreting binaries lead to orbit circularization due to tidal coupling during the accretion phase, Low-Mass X-Ray Binaries (LMXBs) and Cataclysmic Variable-type binaries (CVs) are considered to be the progenitors of MSPs with very short orbital periods ($P_{orb} < 2$ d) and highly circular orbits ($e < 0.1$). I will investigate the progenitors of MSPs with a distribution of long orbital periods, to show the link between WD binaries and long orbits for some binary MSPs. For this task, I will present a study that combines different compact objects in binaries. Knowledge about the values of the orbital parameters (P_{orb}) and spin periods (P_{spin}) of these binaries might be useful for understanding the evolutionary history of the systems. I also present a model that attempts to turn binary MSPs into wide binaries with high eccentricities, because of the asymmetric kick imparted to the pulsar during its birth in a supernova. If the system survives, the resulting system typically has an eccentric orbit with a long orbital period. Or it may disrupt the system and create a single MSP. For this reason, massive CV-type binaries provide an alternative link between AIC and MSPs.

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