

Could low braking-index pulsar J1734-3333 evolve into a magnetar?

Friday, 12 May 2017 09:20 (40 minutes)

In this work, we present a possible interpretation for very small braking index of PSR J1734-3333, which challenges the current theories of braking mechanisms in pulsars, and estimate some initial parameters. According to our suggestions, this pulsar could be born with a superhigh internal magnetic field $\sim 10^{14} - 10^{16}$ G, and could undergo a supercritical accretion soon after its formation in a supernova. This strong magnetic field has been buried under the surface, and is relaxing out of the surface at present due to Ohmic diffusion. The increasing of surface dipole magnetic field results in the small braking index of 0.9. Keep the current field-growth index, the surface dipole field would reach a magnitude of 10^{14} G within $t \sim 50$ kyrs, and would reach the maximum of the internal magnetic field strength in a few hundred kyrs, which implies that this pulsar is a potential magnetar.

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Track Classification: SMFNS2017