DOES THE RADIO LUMINOSITY OF PULSAR GROW UP IN ITS LATER STAGE?

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In usual statistical analyses, because of diversities of proper parameters of pulsars, some interesting features might be smeared. In order to remove these diversities, we use the mean values for all quantities of pulsars, instead of values of individual pulsar, to do statistical analyses. $\log\dot{P}/P^3 - \log\tau$ and $\log L - \log\tau$ have been plotted, here $\tau = P/2\dot{P}$ and L denote the characteristic time scale and the radio luminosity of pulsars respectively. The most striking feature is that after its initial dropping to a dip at about $\tau \sim 10^6$ yrs, the radio luminosity of pulsar appears to grow up evidently and then redrop again. This feature is difficult to be understood in usual models. However, two tentative interpretations have been given in this paper.

First, if the radiation comes from the light cylinder of the pulsar, the radiating region ($\sim R_l^3 \sim P^3$) will be getting larger as pulsar spins down. This may increase the luminosity. However, the luminosity would redrop as P would approach a constant for very large τ.

Second, the apparently growing up of radio luminosities may also be interpreted as due to a lot of new kind of pulsars with relative long initial periods and strong magnetic fields mixed in the procedures of doing average for large τ region rather than due to pulsars' luminosities themselves being growing up.

D. J. Helfand and J.-H. Huang (eds.), The Origin and Evolution of Neutron Stars, 50.