A specific example is the highly magnetized white dwarf in AE Aurigae, where spiky pulsations in hard X-ray are observed [3]. Although it is a binary system with orbital period ~ 0.88 d, there is evidence that the power due to accretion of matter is inhibited by the fast rotation of the white dwarf. Many of the observed physical properties of this white dwarf are very similar to the recently discovered SGR 0418+5729, as we explicitly show in Table 1.

### Summary

The recent observations of the source SGR 0418+5729 cast a firm separation in comparing and contrasting the two models for SGRs and AXPs based respectively on a neutron star and a white dwarf. The limit on the magnetic field derived in the case of neutron star $B_\text{neutron} = 7.5 \times 10^{14}$ G makes it not viable as an explanation based on the magnetar model both from a global energetic point of view and from the undervalued characteristic of the magnetic field. In the white dwarf model, the picture is fully consistent.

Our theory predicts the value of the first derivative of $P$ given by Eq. (1), the surface magnetic field, is, accordingly to Eq. (3), constrained by $1.0 \times 10^{11} \text{G} \leq B_\text{white} \leq 2.7 \times 10^{14} \text{G}$ (see Fig. 1). From the above considerations it is evident that the characteristic changes of period $\Delta P/P = -10^{-7}$, $-10^{-11}$) and the relating bursting activity $\sim (10^{11}-10^{13})$ erg in SGRs and AXPs can be explained in term of the rotational energy loss of white dwarfs. It is also appropriate to recall that similar changes, on smaller scale, are also observed in pulsars and routinely expressed in terms of the rotational energy loss of neutron stars, without appealing to any magnetars phenomena.

### References


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