



Is SGR 0418+5729 indeed a waning magnetar ?

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SGR 0418+5729 is a transient Soft Gamma-ray Repeater which underwent a major outburst in June 2009, during which the emission of short bursts was observed. Its properties appeared quite typical of other sources of the same class until long-term X-ray monitoring failed to detect any period derivative. The present upper limit on \dot{P} implies that the surface dipole field is $B_p \lesssim 7.5 \times 10^{12}$ G (Rea et al 2010), well below those measured in other Soft Gamma-ray Repeaters (SGRs) and in the Anomalous X-ray Pulsars (AXPs), a group of similar sources. Both SGRs and AXPs are currently believed to be powered by ultra-magnetized neutron stars (magnetars, $B_p \approx 10^{14}$ – 10^{15} G). SGR 0418+5729 hardly seems to fit in such a picture. We show that the magneto-rotational properties of SGR 0418+5729 can be reproduced if this is an aged magnetar, ≈ 1 Myr old, which experienced substantial field decay. The large initial toroidal component of the internal field required to match the observed properties of SGR 0418+5729 ensures that crustal fractures, and hence bursting activity, can still occur at present time. The thermal spectrum observed during the outburst decay is compatible with the predictions of a resonant Compton scattering model (as in other SGRs/AXPs) if the field is low and the magnetospheric twist moderate.

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