Extragalactic magnetars and transient radio sources

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We start with a discussion of the observability of giant flares of extragalactic magnetars following [4]. After this we discuss the hypothesis that the bursting activity of magnetars evolves with time analogously to the glitching activity of normal radio pulsars (i.e., sources more active at smaller ages), and that the increase of the burst rate follows one of the laws established for glitching radio pulsars. If the activity of soft gamma repeaters decreases with time in the way similar to the evolution of core-quake glitches ($\propto t^{5/2}$), then it is more probable to find the youngest soft gamma repeaters, but the energy of giant flares from these sources should be smaller than observed 10^{44} – 10^{46} ergs as the total energy stored in a magnetar's magnetic field is not enough to support thousands of bursts similar to the prototype 5 March 1979 flare. These results are published in [3].

Then we propose [5] that the strong millisecond extragalactic radio burst (mERB) discovered by Lorimer et al. [1] may be related to a hyperflare from an extragalactic soft gamma-ray repeater. The expected rate of such hyperflares, $\sim$ 20–50 d^{-1} Gpc^{-3}, is in good correspondence with the value estimated by Lorimer et al. A possible mechanism of radio emission can be related to the tearing mode instability in the magnetar magnetosphere, as discussed by Lyutikov [2], and can produce the radio flux corresponding to the observed 30 Jy from the mERB using a simple scaling of the burst energy.

Finally, we discuss different models to explain properties of the source GCRT J1745–3009.

References

[1] D. Lorimer et al. Science, 318, 777 (2007)
[2] M. Lyutikov. ApJ, 580, L65 (2002)
[3] S. Popov. AN, 329, 15 (2008)
[4] S. Popov, B. Stern. MNRAS, 365, 885 (2006)
[5] S. Popov, K. Postnov; arXiv: 0710.2006

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