

ASTROPHYSICS SEMINAR

Tuesday, 4 August 2009 at 11:00

Magnetars: twists in the magnetosphere

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Abstract. Soft Gamma Repeaters (SGRs) and Anomalous X-ray Pulsars (AXPs) are some of the most energetic (and puzzling) X-gamma ray sources in our Galaxy. Both classes of objects are thought to be extremely magnetized neutron stars, and are well described by the "magnetar model". The external fields of AXPs and SGRs inferred from their periods (~ 10 s) and spin-down rates (up to $\sim 10^{-10}$ s/s) are of order 10^{14} - 10^{15} G. The (persistent) emission of these objects can be interpreted as photons thermally emitted by the neutron star surface, and reprocessed via resonant cyclotron scatterings (RCS) by (mildly) relativistic charges flowing in a "twisted magnetosphere". Models investigated up to now are based on "globally twisted" magnetostatic equilibria, in particular on force-free solutions obtained by twisting an initially dipolar field. Although such RCS spectral models proved quite successful in explaining the persistent emission from the magnetar candidates, there are indications that, at least in some cases, the twist is localized and not necessary global. I shall present more general force-free solutions for a twisted magnetosphere, with particular regard to higher-order twisted multipoles. The phase-resolved spectra and energy-dependent lightcurves obtained with a simple model of a locally sheared field are confronted with the INTEGRAL observations of the AXPs 1RXS J1708-4009 and 4U 0142+61. Some Fermi observations of magnetars will also be discussed.

Additional Information

The seminars are given in the ISDC "Pavillon" building
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