

Physics Colloquium

Monday September 11th, 2006
4:15 PM 428 Pupin Hall
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“ Neutron Stars with Ultra-Strong Magnetic Fields ”

At least 10% of neutron stars are born with ultra-strong magnetic field $B > 10^{14}$ G. These "magnetars" are qualitatively different from normal neutron stars. Their crust is sporadically broken in spectacular star quakes, creating giant X-ray flares -- the brightest transients in the sky. Besides the flares, magnetars produce persistent X-ray emission with luminosity ~ 1000 times brighter than the Sun. It is now established observationally that magnetars have a bright plasma corona. The mysterious coronal activity is likely fed by gradual dissipation of non-potential (twisted) magnetic field around the neutron star. A twist of ultra-strong magnetic field initiates electron-positron discharge that continues to operate quasi-steadily, in the regime of self-organized criticality. The stochastic discharge around the star converts magnetic energy to plasma energy and explains the formation of magnetar corona.

