Timing and spectral study of the isolated neutron star RX J0720.4-3125

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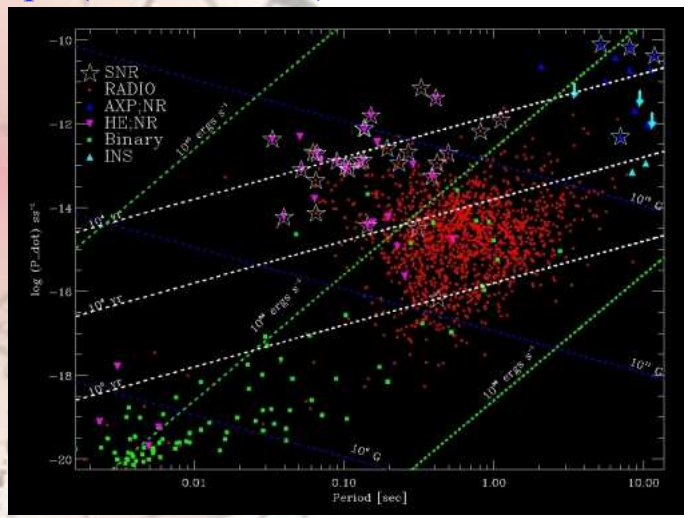
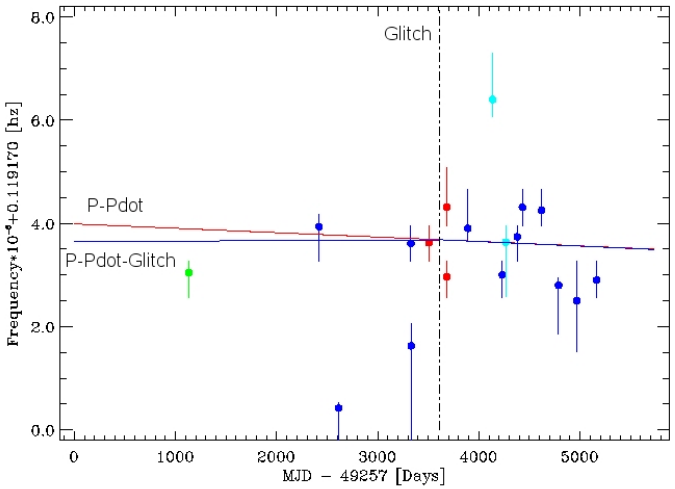
Thermal surface emission from isolated neutron stars provide invaluable information on the physical properties and evolution of neutron star, equation of state at super-nuclear densities, cooling histories, magnetic fields, and surface copositions. Moreover, a freely precessing isolated neutron star may be considered as a potential source of detectable gravitational waves.



P-Pdot Diagram diagram allows for following the lives of pulsars, playing a role similar to the H-R diagram for ordinary stars. It encodes a tremendous amount of information about the pulsar population and its properties. Using period and it's derivative, one can estimate the pulsar age, magnetic field strength, and spin-down power.

Preliminary results of a dedicated effort to measure the characteristic timescale and nature of long-term variations of the isolated neutron star RXJ0720.4-3125 on the base ROSAT, Chandra and XMM-Newton observations, spanning almost 15 years, show that timing residuals and long-term flux variations owing to the low-frequency modulation (eg. precession) or glitch equally probable.



Combined analysis of high resolution XMM-Newton RGS spectra of isolated neutron stars (RX J1856.4-3754, RXJ0720.4-3125, 1RXS J130848.6+212708) show a presence of a broad proton-cyclotron absorption. Possibly, a new absorption feature of mid-Z element (eg. oxygen) is detected in the spectra some of them.