

KMI Colloquium

Magnetars: Physics of the Ultra-Strongly Magnetized Neutron Stars



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Abstract:

Soft gamma repeaters (SGRs) and Anomalous X-ray Pulsars (AXPs) are strange X-ray pulsars showing slow rotations, bright soft X-rays, and recurrent burst activities. Based on accumulating observational evidence, these pulsars are now thought to be magnetically powered neutron stars, or “magnetars” with an extremely strong magnetic field of 10^{10-11} T. Such a field is by 2-3 orders of magnitudes higher than those of normal neutron stars, and well above the quantum critical field, 4.4×10^9 T, and sparking an interest not only in pulsar science but also in wide-ranging astrophysics, even in particle physics or nuclear physics. Such a strong field is considered to induce characteristic burst activities and particular X-ray spectra, little is known about how the magnetic energy is dissipated and converted into the radiation. In order to provide an unified characterization of this class, we performed a comprehensive study of broad-band X-ray spectra, and revealed the spectral evolution correlated with their characteristic age and their magnetic field strength. I will also introduce recent progress of X-ray observation of these mysterious X-ray sources and the future missions.