

Polarization of neutron star emission in future missions

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Radiation emitted in the vicinity of an isolated neutron star is expected to be intrinsically polarized because the high magnetic field ($B \sim 10^{12}$ – 10^{15} G) strongly affects the plasma opacity. The polarization fraction and polarization angle measured by an instrument, however, do not necessarily coincide with the intrinsic ones, due to the effects of both quantum electrodynamics in the highly magnetized vacuum around the star (the vacuum polarization) and rotation of the Stokes parameters in the plane perpendicular to the line of sight induced by the non-uniform magnetic field. I'll review theoretical estimates for the polarization observables in the case of thermal surface emission from neutron stars and of the (soft) X-ray emission from magnetars, where magnetospheric reprocessing of radiation by resonant Compton scattering is important. The potentials of X-ray polarimetry to probe the physical conditions in neutron star sources and to test, for the first time, vacuum polarization are discussed in connection with the recently proposed polarimetric missions: IXPE, recently selected by NASA, and XIPE, under evaluation by ESA for the M4 competition.

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