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THE CONCEPTUAL DESIGN OF X-RAY TIMING AND POLARIZATION SATELLITE

Abstract

The X-ray Timing and Polarization (XTP) mission, as the successor of the Hard X-ray Modulation Telescope (HXMT), is the second major X-ray astronomy satellite proposed in China. It's dedicated to the study of 1-singularity (Black Hole), 2-stars (Neutron Star and Quark Star) and 3-extremes (the physics under extreme gravity, density and magnetism).

Based on the advanced specifications of platform, XTP is designed to have both collimating arrays and focal telescopes onboard. Such payload configuration allows observations of both bright sources and weak ones. The low-energy X-ray collimating array consists of collimators made with LIGA technology and SCD detectors. The high-energy X-ray focal telescope is composed of nested multi-layer mirrors and a novel transmissive-type focal plane detector. A gaseous detector is located before the focal point to make high sensitivity polarization measurement, and the position-sensitive silicon detector behind will make spectrum and timing observation simultaneously.

With a detection area of 2-3 m^2 and a combination of various types of X-ray telescopes, XTP is expected to make the most sensitive temporal and polarization observations with good energy resolution in 1-30 keV. The Minimum Detectable Polarization (MDP) of XTP will reach 3% (1 mCrab, 10⁶s). XTP has been selected as one of the four background satellite projects under CAS's new Innovation 2020 program, and the technical feasibility study is ongoing.