Observation of gamma-ray lines with INTEGRAL

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Abstract

The observation of gamma-ray lines is a powerful tool for studying nuclei freshly produced by stellar nucleosynthesis and positrons origin, as well as the physical conditions of the interstellar medium in which they emit gamma-ray. Unfortunately, the sensitivity and the spatial resolution of instruments are limited in this energy range due to the difficulty to perform accurate images and due to the high instrumental background rate experienced in spatial environment. The SPI spectrometer on the INTEGRAL observatory was specifically designed to observe gamma-ray lines from diffuse emissions. The purpose of this presentation is to review the main results obtained by INTEGRAL over the course of its 22-year mission regarding: annihilation emission of Galactic positrons, gamma-ray lines from radioactive nuclei produced and ejected by massive stars, and gamma-ray lines from the thermonuclear supernova SN2014J. In the conclusion, I will briefly discuss on Compton Spectrometer and Image (COSI), the future space-based gamma-ray telescope.

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