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On the behavior of the black hole candidate 1E 1740.7−2942's corona based on long-term INTEGRAL database

One of the most straightforward ways to explain the hard X-ray spectra observed in X-ray binaries is to assume that comptonization of soft photons, originated in the disk, is occurring. The region in which such comptonization takes place, called the corona, is commonly characterized by only two parameters: its thermal energy kT and its optical depth τ. Thus, hard X-ray spectra analysis is an important tool in diagnosing the behavior of these parameters.

In this work we analyzed a large number ($>$300) of hard X-ray spectra (20−200 keV) of the black hole candidate 1E 1740.7−2942 (1E, henceforth). Data were retrieved from the INTEGRAL satellite public database. By applying simple and widely used models to fit these data, we were able to verify that thermal comptonization describes the spectra of 1E in these energies very well, regardless of the source's luminosity. The Compton parameter y values, computed from kT and τ provided, show that 1E remains in the unsaturated comptonization regime for almost the entire sample; moreover, the predicted power-law indices calculated from y are in agreement with the indices found when a phenomenological power-law model is applied to the spectra. We believe, then, that the spectral changes observed in 1E for this energy range, attributed to different power-law indices, may be explained by means of only these two corona parameters' variations.

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