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Unveiling the hard X-ray emission of NGC 1068, a possible high energy neutrino source

One of the central questions in high-energy astrophysics is the origin of high-energy cosmic rays and neutrinos. The Seyfert 2 Compton-thick AGN NGC 1068 stands out as a promising candidate for high-energy neutrino emission, with a significance level of 4.2. Various models have been proposed to explain the multi-messenger emission associated with this source. X-ray data are crucial for constraining the presence of a potential hadronic component in the electromagnetic spectral energy distribution of AGNs. In this context, we analyzed publicly available data from XMM-Newton, NuSTAR, INTEGRAL-IBIS, INTEGRAL-SPI and Swift-BAT spanning over more than 20 years. The resulting spectra cover the 3–195 keV energy range, allowing us to investigate the presence of a cutoff in the hard X-ray regime and thereby explore its hadronic versus leptonic origin. Our analysis confirms that the spectrum is dominated by Compton reflection processes up to 80 keV, while the hard X-ray component does not show any significant cutoff. We will discuss the implication of these results in the context of the multi-messenger emission of NGC 1068.

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