The INTEGRAL Legacy on Black Hole X-ray Binaries

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Abstract

Galactic black hole binaries represent one of the most prominent source classes for understanding accretion-ejection physics in extreme gravitational regimes, with recent detections at TeV energies further highlighting their role as cosmic accelerators. They show a variety of complex accretion states and transitions in the X/γ-ray domain, which are strongly connected to different outflow regimes, including both jets and winds. In this review, we present a synthesis of the legacy results obtained on black hole binaries throughout the INTEGRAL mission, highlighting how its long-term monitoring and high-energy sensitivity above 100 keV have significantly advanced our knowledge in the field of relativistic astrophysics. We summarise the state-of-the-art of the field, with a particular focus on broadband spectral evolution, state transitions, and the persistent debate surrounding the high-energy emission observed above 200 keV". We discuss the main physical scenarios proposed to account for this hard component and highlight the role of both polarization and physical models in disentangling these processes. Future MeV missions, such as COSI, will be instrumental in answering these open questions.

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