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X-ray binaries as cosmic ray and neutrino sources

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Since their discovery, cosmic rays (CRs) remain among the most mysterious phenomena of modern Physics. The dominant sources, as well as the exact acceleration mechanisms, remain unknown. The CRs up to the “knee” have traditionally been considered to originate entirely in the shock waves of supernova remnants (SNRs), however, due to the lack of a “smoking-gun” TeV counterpart in many cases, as well as the new population of non-SNR Galactic PeVatrons, this scenario has been recently questioned. In this talk, I will motivate how the small-scale analogues of active galactic nuclei, namely black-hole X-ray binaries (BHXBs), can potentially contribute to the Galactic CR spectrum. Based on a new multi-zone, lepto-hadronic jet model to take advantage of the entire broadband multiwavelength spectra observed by BHXBs, I will discuss how to properly estimate the neutrino and γ -ray emissions and how these two compare to current observations. Finally, I will discuss the contribution of these sources to the diffuse γ -ray and neutrino spectra detected by Fermi and HESS, and IceCube, respectively.

Primary author: KANTZAS, Dimitrios

Co-authors: GAGGERO, Daniele (Istituto Nazionale di Fisica Nucleare); CALORE, Francesca (LAPTh, CNRS); PETROPOULOU, Maria (National and Kapodistrian University of Athens); DE LA TORRE LUQUE, Pedro (Oskar Klein Centre, Stockholm University); Prof. MARKOFF, Sera (UvA)

Presenter: KANTZAS, Dimitrios

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