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The impact of the Cosmic-Ray diffusion in the gamma-ray observations of the Galactic Centre region

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Our Galaxy is a reservoir of extremely energetic cosmic rays (CRs) launched in the interstellar environment by powerful particle accelerators. The galactic magnetic fields confine CRs which travel causes gamma rays to be produced by the interactions with the gaseous matter locked in the Milky Way. Indeed, the interplay between the interstellar medium and CRs is of crucial relevance, as it acts like a passive source of gamma rays. This diffuse emission has a critical role in the analysis of gamma-ray data since it represents the background emission above which we can solve and detect sources. A complete and deepen understanding of the spectral and morphological nature of the large-scale background diffuse emission is fundamental for providing to collaborations increasingly realistic models in order to perform consistent and coherent analysis.

In this contribution some phenomenological models computed to reproduce such diffuse gamma-ray emission are scrutinized against currently available measurements. The choice of a certain parametrization of CR transport equations affects the spectrum of the related diffuse gamma-ray emission, as it leads to a variety of potential estimations which play a key role in this context, along with a realistic description of the gas distribution in our Galaxy. In view of the Cherenkov Telescopes Array Observatory (CTAO) era, the analysis and comparisons reported in this contribution are of crucial relevance for the study of the galactic gamma-ray emitters, particularly in complex scenarios like the Galactic Centre.

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