

H.E.S.S. observations of galactic molecular clouds

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Cosmic Ray (CR) interactions with the dense gas inside Giant Molecular Clouds (GMCs) produce neutral pions, which in turn, decay into gamma rays. Because of the high target density for CRs in GMCs the study of gamma-ray emission from GMCs can yield a model-independent insight into the spatial and spectral properties of CRs without any significant contamination by other sources. While multiple such studies have been performed at GeV energies using the Fermi-LAT, measurements at TeV energies have been complicated due to difficulties separating such faint extended emission from the large scale galactic diffuse emission and the dominant residual hadronic background.

Using field-of-view models for the residual hadronic background and a 3D likelihood method, eg, as implemented in gammapy, we model the emission from the direction of the clouds with a gas tracer template while masking the known sources in the field. This allows us to probe the CR density at specific points in the galaxy, and in turn, distribution of CR sources and the propagation of CRs. In this contribution, we will present the analysis strategy and report on observations of molecular clouds as seen by H.E.S.S.

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