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Diffuse Galactic Gamma Rays at intermediate and high Latitudes, Constraints on ISM properties and DM

The measurements with unprecedented accuracy by Fermi of the diffuse gamma ray emission in the Galaxy at energies between 100 MeV and 100 GeV are a very powerful tool to probe and constrain the properties of sources and propagation of cosmic rays (CRs) in the Galaxy, as well as interstellar medium (ISM). In particular, high latitude data (|b|>10) depend mainly on properties of the local enviroment, i.e. the same regime being probed by the measurements of the local CR fluxes. Starting from a wide set of models compatible with local secondary to primary ratios, the local fluxes of protons, Helium nuclei and leptons, we discuss the additional information obtained comparing against the high latitude diffuse emission, the strongest implications being on the ISM gas distribution and the scale height of the diffusion region.

Understanding better the contribution of conventional astrophysical sources to diffuse gamma rays may have implications on indirect dark matter (DM) searches. By including DM as a possible source of antiprotons, leptons and gamma rays, we have performed a combined analysis to derive constraints on the DM annihilation rate. We have studied a garden variety of DM candidates including supersymmetric, leptophilic as well as light WIMP models suggested by direct detection searches.

Primary author: TAVAKOLI, Maryam (SISSA; INFN, Sezione di Trieste)

Co-authors: EVOLI, Carmelo (SISSA; National Astronomical Observatories, chinese Academy of Science); CHOLIS, Ilias (SISSA; INFN, Sezione di Trieste); MACCIONE, Luca (DESY, Theory Group); ULLIO, Piero (SISSA; INFN, Sezione di Trieste)

Presenter: TAVAKOLI, Maryam (SISSA; INFN, Sezione di Trieste)