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HI absorption and Galactic Center Excess

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Pohl et al. (2008) used a gas-flow model based on a SPH simulation to deconvolve Galactic CO data. They employed an iterative method to successively reduce signal in the line spectrum and place it at the eight best-matching distance intervals, until there is only noise left. In Macias et al. (2018) an analogous deconvolution of HI data was found to provide a better fit to the diffuse gamma-ray emission from the Galactic-center region than do the gas maps of the standard Fermi-LAT data analysis pipeline. The absorption correction was minimal and involved only self-absorption with constant excitation temperature of 170 K. Continuum emission was ignored, which means weak positive signal was deemed optically thin and negative signal had to be disregarded. In the Galactic-center region these simplifications lead to a potentially significant underestimation of the mass of atomic gas, and hence a deficit in the predicted diffuse gamma-ray emission and an artificial indication for new emission components.

In this talk we will present an advanced model of atomic gas in the Galaxy and apply it to the analysis of gamma-ray emission from the Galactic center. We account for both line and continuum emission in the radiation transport, which allows the modelling of negative line intensity and traces gas in both emission and absorption. We find good fits to the HI data for a broad range of excitation temperatures. We will also discuss whether the new maps provide a better fit to the Fermi-LAT Galactic-center data and whether the estimates of the Galactic-center excess are affected.

Keywords

Galactic center Excess; Fermi-LAT; HI density distribution

Collaboration

other Collaboration

Subcategory

Theoretical Results

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