

Quantifying Dependencies in Cosmic-Ray Transport

Context: Numerical Simulations; Cosmic-Ray Transport;

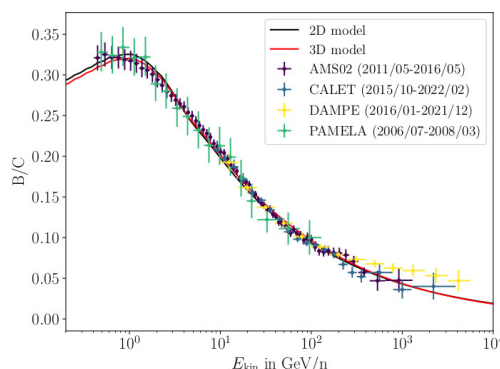
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Abstract

Cosmic rays in our Galaxy are subject to diffusive transport, advection with Galactic gas, energy losses, etc. These effects are combined in the cosmic-ray transport equation, where they are described via different physical parameters like, e.g., the strength of spatial diffusion, the speed of advection, and others. Correspondingly, searching for a fit to observations of cosmic-ray spectra means to adapt different of these parameters, so the simulated spectra correspond to the observed ones. This bachelor topic aims to make this fitting procedure more systematic. For this, the student will analyse the numerical results for different simulation, to determine the gradient in the solution with respect to different of these transport parameters. This will quantify how the cosmic-ray spectra depend on different parameters, thus making finding a good fit easier than before.

Helpful Skills

- Interest in statistical analysis
- Interest in numerical modelling (C++ and Python)



Comparison of data and simulation result for B/C ratio in Galactic cosmic-rays.