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Propagation of TeV-energy cosmic rays using stochastic differential equations in CRPropa3.1

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The propagation of charged cosmic rays through the Galactic environment influences all aspects of the observation at Earth. Energy spectrum, composition and anisotropy are changed due to deflections in magnetic fields and interactions with the interstellar medium. Today the transport is simulated with different simulation methods either based on the solution of a transport equation (multi-particle picture) or a solution of an equation of motion (single-particle picture).

We developed a new module for the publicly available Propagation software CRPropa3.1, where we implemented an algorithm to solve the transport equation using stochastic differential equations. This technique allows us to use a diffusion tensor which is anisotropic with respect to an arbitrary magnetic background field, such as the well-known JF12 field.

In this contribution, we present first studies on the influence of a anisotropic diffusion along the magnetic field line on the cosmic ray outflows and compare our results to observations.

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