An ab initio approach to the turbulence-modified drift coefficient for galactic cosmic rays in the heliosphere

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Abstract. **Gradient and curvature drift is considered one of the key processes that determine the modulation of cosmic rays in the heliosphere. Although purely theoretical expressions for turbulence-modified drift exist, commonly an ad hoc approach is used for the drift coefficient in order to determine its effects on cosmic-ray modulation. This paper entails an ab initio attempt to produce a feasible expression for the drift coefficient. Using the approach of Bieber et al. (1997) as an initial guess, their result is compared with the direct numerical simulations of Minnie et al. (2007), and then modified to fit the simulation data for the drift coefficient as function of the level of turbulence and for different particle energies. The results of this parametric analysis illustrate the qualitative influence of magnetic field variance and correlation length on the radial, latitudinal and rigidity dependencies of the drift coefficient. Preliminary results indicate that the extend to which the turbulence influences the propagation of cosmic rays might be dependent on, among other quantities, the value of the ultrascale, but the functional form for the latter is yet unknown. The parametric form for the drift coefficient is compared with the so-called weak-scattering form which is valid in the absence of turbulence, and their relative effect on cosmic rays is discussed.**

Keywords**: Cosmic rays, Drift, Turbulence.**

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REFERENCES

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