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CR scattering against pre-existing MHD turbulent modes

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We present the phenomenological implications of the micro-physics of CR diffusion as resulting from particle scattering onto the three modes in which \textit{Magneto-Hydro-Dynamics} (MHD) cascades are decomposed. We calculate the diffusion coefficients from first principles based on reasonable choices of the physical quantities characterizing the different environments of our Galaxy, namely the \textit{Halo} and the \textit{Warm Ionized Medium}, and implement for the first time these coefficients in the {\tt DRAGON2} numerical code. Remarkably, we obtain the correct propagated slope and normalization for all the charged species taken into account, without any \textit{ad-hoc} tuning of the transport coefficients. We show that fast magnetosonic modes dominate CR confinement up to $\sim 100\,\mathrm{TeV}$; Alfv\'enic modes are strongly subdominant due to the anistropy of the cascade (in agreement with previous findings) up to rigidities in the sub-PeV domain, where their contribution may show up as a spectral feature, potentially observable in the upcoming years. We also find that such framework cannot be responsible for CR confinement below $\sim 200\,\mathrm{GeV}$, possibly leaving room for an additional confinement mechanism, and that the Kolmogorov-like scaling of the B/C ratio cannot be reproduced. Therefore this scaling might not be the imprint of the pre-exisiting turbulence spectrum

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