Erratum: “Superdiffusion of Cosmic Rays: Implications for Cosmic Ray Acceleration” (2014, *ApJ*, 784, 38)

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An error is found in Table 1 of the published article describing the regimes of diffusion and superdiffusion. For the weak turbulence when the scales s measured along the magnetic field are larger than the turbulence injection scale L , the separation of magnetic field lines increases in a diffusive way with the step LM_A^4 , where M_A is the Alfvén Mach number, i.e., $M_A = V_L/V_A$, where V_L is the turbulent injection velocity and V_A is the Alfvén velocity. We provide Table 1 with the error corrected here.

The separation of magnetic field lines was studied in Lazarian & Vishniac (1999). There it was found there that for the weak turbulence at scales $s \gg L$, where s is measured along the magnetic field and L is the injection scale of turbulence the separation is growing as a random walk with the step LM_A^4 , where M_A is the Alfvén Mach number. This result was used in further publications, e.g., in Lazarian (2006) to study the propagation of heat in clusters of galaxies. Unfortunately, due to an error the corresponding entry in our published article is incorrect. We provide the corrected version of the Table 1 here describing the separation of magnetic field lines for different regimes of MHD turbulence.

Table 1
 Regimes of MHD Turbulence and Magnetic Field Separation

Type of MHD Turbulence	Injection Velocity	Range of Scales	Spectrum $E(k)$	Motion Type	Ways of Study	Magnetic Diffusion	Squared Separation of Lines
Weak	$V_L < V_A$	$[l_{\text{trans}}, L]$	$k_{\perp}^{-2}$	wave-like	analytical	diffusion	$\sim sLM_A^4$
Strong subAlfvénic	$V_L < V_A$	$[l_{\text{min}}, l_{\text{trans}}]$	$k_{\perp}^{-5/3}$	anisotropic eddy-like	numerical	Richardson	$\sim \frac{s^3}{L}M_A^4$
Strong superAlfvénic	$V_L > V_A$	$[l_A, L]$	$k_{\perp}^{-5/3}$	isotropic eddy-like	numerical	diffusion	$\sim s l_A$
Strong superAlfvénic	$V_L > V_A$	$[l_{\text{min}}, l_A]$	$k_{\perp}^{-5/3}$	anisotropic eddy-like	numerical	Richardson	$\sim \frac{s^3}{L}M_A^3$

Note. L and l_{min} are the injection and perpendicular dissipation scales, respectively. $M_A \equiv \delta B/B$, $l_{\text{trans}} = LM_A^2$ for $M_A < 1$ and $l_A = LM_A^{-3}$ for $M_A > 1$. For weak Alfvénic turbulence $\ell_{\parallel}$ does not change. s is measured along magnetic field lines.

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References

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