Abstract Submitted
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Cosmic Ray Self-Confinement, Escape and Transport[1] MIKHAIL MALKOV, UCSD — Propagation of cosmic rays (CR) in a self-confinement regime is discussed. A self-similar solution for a CR-cloud expansion along the magnetic field strongly deviates from test-particle results. The normalized CR partial pressure is close to $\mathcal{P}\left(\surd, \ddagger, \sqcup\right) = \in\left[|\ddagger|^{\nabla/\ni} + \ddagger_{\mathrm{dif}}^{\nabla/\ni}\left(\surd, \sqcup\right)\right]^{-\ni/\nabla} \exp\left[-\ddagger^{\in}/\triangle\mathcal{D}_{\mathcal{B}}\left(\surd\right)\sqcup\right]$, where p is the momentum of CR and z is directed along the field. The core of the cloud expands as $z_{dif} \propto \sqrt{D_{NL}\left(p\right)t}$ and decays in time as $\mathcal{P} \propto \in\ddagger_{\lceil\rangle\{}^{-\infty}\left(\sqcup\right)$. The diffusion coefficient D_{NL} is strongly suppressed compared to its background value D_{B}: $D_{\mathrm{NL}} \sim D_{\mathrm{B}} \exp\left(-\Pi\right) \ll D_{\mathrm{B}}$ for sufficiently high field-line-integrated CR partial pressure, Π. When $\Pi \gg 1$, the CRs drive Alfven waves efficiently enough to build a *transport barrier* ($\mathcal{P} \approx \in/|\ddagger|$ -"pedestal") that strongly reduces the leakage. The solution has a spectral break in momentum spectrum at $p = p_{\mathrm{br}}$, where p_{br} satisfies the following equation $D_{\mathrm{NL}}\left(p_{\mathrm{br}}\right) \simeq z^2/t$. Magnetic focusing effects in CR transport are briefly discussed.

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Mikhail Malkov
UCSD

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