

3-D ANISOTROPIES OF GALACTIC COSMIC RAYS: THEORETICAL MODELING

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We report on 3-dimensional model calculations on the anisotropies of galactic cosmic rays that appear as solar and sidereal daily waves in earth based observations. Both the ecliptic and the sector-dependent North-South components of the anisotropy are considered. Particular attention is paid to the N-S component which is widely utilized to infer radial gradients and which cannot be properly addressed in 2-D models. We illustrate that the cross-field streaming due to latitudinal gradients may be considerable and the simple picture based merely on the $B \times \nabla U$ streaming may, in some instances, be misleading in inferring the radial gradient. We present 3-D simulations assuming different forms of the diffusion tensor. The concept of upper limiting cutoff rigidity will also be addressed. At high rigidities the diffusive approximation becomes inapplicable and other theoretical description is required. An extension of numerical modeling is proposed for the regime of upper limiting cutoff.