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The Isotropy Problem of Ultra-High Energy Cosmic Rays: The Effects of Anisotropic Transport RAHUL KUMAR, DAVID EICHLER, Ben-Gurion University — Time dependent anisotropic transport of ultra-high energy cosmic rays (UHECRs) from point-like sources in the Galaxy is calculated in various ways. To fully account for the discreteness of UHECR sources in space and time, the Monte Carlo method is used to randomly place sources in the Galaxy and calculate the anisotropy of UHECR flux, given specific realisations of source distribution. We show that reduction in the rate of cross-field transport reduces the anisotropy. However, if the crossfield transport is very small, drift of UHECRs in the Galactic magnetic field (GMF) becomes the dominant contributor to the anisotropy. Test particle simulations further illustrate the effect of drift and verify our analytical calculation. The surprisingly low anisotropy measured by Auger can be interpreted as intermittency of UHECR sources, without invoking a flat source distribution and/or a high source rate. Frequent events that follow star formation, such as hypernovae, imply an anisotropy that exceeds the Auger limit.

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