

Deciphering the Dipole Anisotropy of Galactic Cosmic Rays

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Recent measurements of the dipole anisotropy in the arrival directions of Galactic cosmic rays (CRs) indicate a strong energy dependence of the dipole amplitude and phase in the TeV-PeV range. We argue here that these observations can be well understood within standard diffusion theory as a combined effect of (i) one or more local sources at Galactic longitude $120\text{deg} < l < 300\text{deg}$ dominating the CR gradient below 0.1-0.3 PeV, (ii) the presence of a strong ordered magnetic field in our local environment, (iii) the relative motion of the solar system, and (iv) the limited reconstruction capabilities of ground-based observatories. We show that an excellent candidate of the local CR source responsible for the dipole anisotropy at 1-100 TeV is the Vela supernova remnant.

Summary

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