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Inductive acceleration of UHECRs in sheared relativistic jets

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Abstract content

Relativistic outflows carrying large scale magnetic fields have large inductive potential and may accelerate protons to ultra high energies. We discuss a novel scheme of Ultra-High Energy Cosmic Ray acceleration due to drifts in magnetized, cylindrically collimated, sheared jets of powerful active galaxies.

We point out that a positively charged particle carried by such a flow is in an unstable equilibrium if $\mathbf{B} \cdot \nabla \times \mathbf{v} < 0$, so that a kinetic drift along the velocity shear would lead to fast, regular energy gain. The key features of the mechanism are (i) the highest rigidity particles are accelerated most efficiently implying the {\it dominance of light nuclei } for extragalactic CRs; (ii) acceleration rate {\it increases} with energy and {\it does} reach the theoretical maximum of inverse relativistic gyro-frequency.

If this papers is presented for a collaboration, please specify the collaboration

Summary

Reference

Proceedings of the 30th International Cosmic Ray Conference; Rogelio Caballero, Juan Carlos D'Olivo, Gustavo Medina-Tanco, Lukas Nellen, Federico A. Sánchez, José F. Valdés-Galicia (eds.); Universidad Nacional Autónoma de México, Mexico City, Mexico, 2008; Vol. 4 (HE part 1), pages 483-486

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