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Cosmic ray self-confinement close to extragalactic sources

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Ultra-high energy cosmic rays observed at the Earth are most likely accelerated in extra-galactic sources. For typical source luminosities invoked for such sources, we show that the electric current associated with cosmic rays escaping their sources is large enough to induce plasma instabilities that create magnetic fluctuations able to confine particles close to their sources for energies below $\sim 10^7 - 10^9$ GeV. The implications for models of the transition from Galactic to extragalactic will be discussed. We show that the magnetic field that results from the confinement is basically the equipartition magnetic field caused by the current of escaping cosmic rays.

Collaboration

– not specified –

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