



Contribution ID : 1185

Type : Oral

Ultrahigh energy cosmic rays as heavy nuclei from cluster accretion shocks

Saturday, 7 July 2007 08:54 (0:12)

Abstract content

Large-scale accretion shocks around massive clusters of galaxies, generically expected in hierarchical scenarios of cosmological structure formation, are shown to be plausible sources of the observed ultrahigh energy cosmic rays (UHECRs) by accelerating a mixture of heavy nuclei including the iron group elements. Current observations can be explained if the source composition at injection for the heavier nuclei is somewhat enhanced from simple expectations for the accreting gas. The proposed picture should be clearly testable by current and upcoming facilities in the near future through characteristic features in the UHECR spectrum, composition and anisotropy, in particular the rapid increase of the average mass composition with energy from 10^{19} to 10^{20} eV. The associated X-ray and gamma-ray signatures are also briefly discussed.

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'Olive, 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 555-558

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Session Classification : HE 1.4.B

Track Classification : HE.1.4.B