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Cosmogenic Neutrinos from the propagation of Ultra High Energy Cosmic Rays

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Abstract content

We calculate the flux of neutrinos generated by the propagation of ultra-high energy nuclei over cosmological distances. The propagation takes into account the interactions with cosmic background radiations including the CMB and the most recent estimates of higher energy (infra-red, optical, and ultra violet) backgrounds. We assume that the composition of ultra-high energy cosmic rays (UHECRs) at the source is the same as the observed one at low energies. This assumption fits well the present data at the highest energies. We compare the cosmogenic neutrino flux from mixed composition sources to pure proton sources. We find that the neutrino flux in the mixed composition case has a high energy peak, mainly due to photopion production off CMB photons, of similar shape and amplitude to the proton case. At low energies both composition cases have significant neutrino flux with a peak around 1014.5 eV due to the higher energy backgrounds. The mixed composition case induces a higher flux of neutrinos at energies below 1013 eV due to the neutron decay component that extends down to low energies. Detection of diffuse neutrino fluxes at ultra high energies can strongly constrain the source distribution of UHECR whereas fluxes at lower energies could be used to constrain confinement of VHE and UHE cosmic rays if combined with composition analysis from cosmic ray experiments.

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. 3 (OG part 2), pages 1249-1252

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