

Neutron-Proton-Conversion Acceleration at Subphotospheres of Relativistic Outflows

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We study a type of particle acceleration that operates via neutron-proton conversion (NPC) in in-elastic nuclear collisions. This mechanism can be expected for relativistic shocks at subphotospheres if relativistic outflows contain neutrons. Using a test-particle approximation, we numerically calculate the energy spectrum and the efficiency of accelerated particles, and show that a good energy fraction of the nucleons may be accelerated. The NPC acceleration may especially be relevant if the shock is radiation-mediated, and it would enhance the detectability of GeV-TeV neutrinos.

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