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Study of the production of high-energy neutrinos in the environment of binary-neutron-star mergers.

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Gamma-rays and neutrinos are important probes of astrophysical sources and acceleration mechanisms of ultra-high energy cosmic rays (UHECRs). UHECRs can interact with the radiation field and the baryonic material within the source and produce neutrinos in pion decay chains. These neutrinos are subject mostly to redshift and flavour oscillation during their propagation to Earth and contain information on sources otherwise not accessible.
We focus on compact objects surrounded by an accretion disk, of the type that are likely end states of a binary-neutron-star (BNS) merger. We model the target photon field in the source as a black body, using a modified version of the code SimProp v2r4 to simulate the propagation and interactions of UHECRs in this environment. We explore various combinations for composition, spectral index, high-energy cutoff of the UHECR primaries.
The neutrino fluxes arriving at Earth are compared to the astrophysical IceCube flux, and some constraints on the BNS merger rate can be deduced.

Keywords

“High-energy neutrinos;Binary-neutron-star merger;Cosmic ray interactions”

Collaboration

other Collaboration

Subcategory

Theoretical Results

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