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Cumulative Neutrino and Gamma-Ray Backgrounds from Halo and Galaxy Mergers[1] CHENGCHAO YUAN, PETER MESZAROS, KOHTA MURASE, DONGHUI JEONG, Pennsylvania State University — The merger of dark matter halos and the gaseous structures embedded in them results in strong shocks that are capable of accelerating cosmic rays (CRs) to ~ 10 PeV. In this work, we study the contributions of these halo mergers to the diffuse neutrino flux and to the non-blazar portion of the γ-ray background. We formulate the redshift dependence of the shock parameters over the dark matter halo distribution up to a redshift $z = 10$. We find that high-redshift mergers contribute a significant amount of the cosmic-ray energy luminosity density, and the resulting neutrino spectra could explain a large part of the observed diffuse neutrino flux above 0.1 PeV up to several PeV. Our model can somewhat alleviate tensions with the extragalactic γ-ray background. First, since a larger fraction of the CR energy luminosity density comes from high redshifts, the accompanying γ-rays are more strongly suppressed through $\gamma\gamma$ annihilations with the cosmic microwave background and the extragalactic background light. Second, mildly radiative-cooled shocks may lead to a harder CR spectrum with spectral indices of $1.5 \leq s \leq 2.0$. Our study suggests that halo mergers can be promising neutrino emitters without violating the non-blazar *Fermi* constraints.

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