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(G*) The Effect of Nucleonic Interaction on Neutrinos from Neutron Star Black Hole Mergers

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During neutron star black hole collision events, 20 percent of the binding energy is released in the form of neutrinos. These mergers form a black hole with a disk of matter accreting into it. The neutrino signal observed on earth will depend on where the neutrinos become free from the system; this is called the neutrino surface. The neutrino surface can be determined based on hydrodynamic simulations of the accretion disk. Energies of released neutrinos are then obtained at the neutrino surfaces and used to calculate the neutrino flux, which will determine the observed signal on earth. The neutrino surface is determined by calculating neutrino cross sections for grid points. Given the relatively high density of accretion disks, the effect of nucleonic interaction on the cross section is examined. This effect can be encapsulated in structure factors which we calculate using energy density functionals in the random phase approximation, and using the viral approximation.

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