

Abstract Submitted
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nuSpaceSim: A Comprehensive Simulation Package for Modeling Extensive Air Shower Signals from Cosmic Neutrinos for Space-based Experiments¹ JOHN KRIZMANIC, UMBC/CRESST/NASA/GSFC, NUSPACESIM COLLABORATION — nuSpaceSim is a comprehensive end-to-end simulation package to model the optical and radio signals from extensive air showers (EASs) induced by cosmic neutrino interactions. The development has initially focused on modeling the upward-moving EASs sourced from tau neutrino interactions within the Earth starting at the PeV energy scale. nuSpaceSim is designed to model all aspects of the processes that lead to the neutrino-induced EAS signals, including the modeling of the neutrino interactions inside the Earth, propagating the leptons into the atmosphere, modeling the tau lepton decays, forming composite EASs, generating the air optical Cherenkov and radio signals, and their propagation through the atmosphere (including cloud maps). nuSpaceSim uses a vectorized Python implementation of a sampled library approach to efficiently simulate signals at a specific location where the detector response module records the events. The framework allows for the calculation of the sky coverage and the pointing requirements for ToO follow-up observations of transients, and the assessment of UHECR backgrounds. nuSpaceSim will provide an efficient and practical cosmic neutrino EAS signal generation modeling package to aid in the development of future sub-orbital and space-based experiments.

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John Krizmanic
NASA Goddard Space Flight Center

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