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Cosmogenic neutrino fluxes under the effect of active-sterile secret interactions

We study the observable effects of a secret active-sterile interactions, mediated by a pseudoscalar, on the expected flux of cosmogenic neutrinos. The results show that for masses of sterile neutrinos and pseudoscalars of hundreds MeV, necessary to evade cosmological, astrophysical and elementary particle constraints, the presence of such new interactions can significantly change the energy spectrum of cosmogenic neutrinos at Earth in the energy range from PeV to ZeV. Interestingly, the distortion of the spectrum results to be detectable at GRAND apparatus if the scalar mediator mass is around 250 MeV and the UHECRs are dominated by the proton component. Larger mediator masses or a chemical composition of UHECRs dominated by heavier nuclei would require much larger cosmic rays apparatus which might be available in future.

Mini-abstract

Active-sterile secret interactions can change cosmogenic neutrino spectra

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