UM Physics Department

Miami 2020 Physics Conference (Online)

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Title: Neutrino oscillations in gravitational fields and astrophysical applications

Abstract:

We study propagation and oscillations of neutrinos in curved spacetime backgrounds. First, we are interested in spin oscillations of neutrinos scattered off a black hole. This research is inspired by the recent observation of the black hole shadow. We analyze how flux of neutrinos is modified by the gravitational interaction with a black hole surrounded by an accretion disk, accounting for the neutrino spin precession. Second, we study flavor oscillations of neutrinos in stochastic gravitational waves. This research is motivated by the recent observation of gravitational waves. We find the fluxes of astrophysical neutrinos measured by a terrestrial detector. These neutrinos are supposed to be emitted by randomly distributed sources and interact with stochastic gravitational waves with realistic spectra. The implication of the obtained results for neutrino astronomy is discussed. References 1. M. Dvornikov, Flavor ratios of astrophysical neutrinos interacting with stochastic gravitational waves having arbitrary spectra, to be published in JCAP (2020), arXiv:2009.02195. 2. M. Dvornikov, Spin oscillations of neutrinos scattered off a rotating black hole, Eur. Phys. J. C 80, 474 (2020), arXiv:2006.01636. 3. M. Dvornikov, Spin effects in neutrino gravitational scattering, Phys. Rev. D 101, 056018 (2020), arXiv:1911.08317. 4. M. Dvornikov, Neutrino flavor oscillations in stochastic gravitational waves, Phys. Rev. D 100, 096014 (2019), arXiv:1906.06167.