

”Search for neutrinos from diffuse dark matter annihilation in Super-Kamiokande”

This work presents a search for a signal from diffuse dark matter annihilation in atmospheric neutrino data of Super-Kamiokande-I, -II and -III. We focus on the signal arising from a diffuse source of dark matter annihilation in the Milky Way halo. We consider the scenario with dark matter particles annihilating directly to two neutrinos, equally to all flavors. In such a case, resulting neutrino energy would be the same as the mass of annihilating relic particles. Thus, annihilation induced neutrinos would introduce a characteristic modification to the observed atmospheric neutrino energy spectra. One could also expect that neutrinos from diffuse dark matter annihilation would have an isotropic zenith angle distribution. The Super-Kamiokande data set of 2806 days of exposure was investigated for the presence of such a signatures. In this analysis we assume that collected data could be described by two components: dark matter induced neutrinos (signal) and atmospheric neutrinos (background). We try to find the best combination of signal and background that would fully explain the data. We allow to vary the oscillation parameters that are related to estimation of atmospheric neutrino background and vary the hypothetical contribution from simulated dark matter signal. In this approach we can constrain the number of dark matter induced events which are compatible with the data. The search could be also related to dark matter decay scenarios.

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