

Sterile Neutrinos in the Global-fit Analysis and the Astro-particle Search

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Abstract: The sterile neutrino is an extension of the standard model. The active-sterile mixing breaks the unitarity condition in the 3-neutrino mixing, and might also affect the supernova neutrino detection results. We currently have hints of this new mixing in very-short-baseline experiments, such as reactor and LSND anomalies, and so on. However, we have not reached the same conclusion in the other experiments or observatories. This talk will be separated into two parts. In the first part we will discuss on the unitarity conditions with the current data, including the medium baseline reactor, long baseline reactor, solar, and long baseline accelerator data. We find that the unitary 3-neutrino mixing fits the data, though the uncertainties in the tau-on neutrino sector is still large. In the second part, we consider the fact that the active-sterile mixing might alter the supernova neutrino event numbers. By this, we find that for a core-collapse supernova at 10 kpc, the difference in the event numbers with and without sterile neutrinos allows to exclude the sterile neutrino hypothesis (the current best fit) at more than 99% confidence level robustly.