



ID de Contribution: 68

Type: Non spécifié

Search for neutrinos associated with solar flares in the Super-Kamiokande detector

Search for neutrinos produced during solar flares has been discussed for the last 60 years while clear signals of neutrinos associated with solar flares (solar flare neutrinos) have not been identified yet. Since neutrinos are not affected by the interplanetary magnetic field, solar flare neutrinos may give a hint of particle acceleration mechanism in solar flares. According to some theoretical predictions, the flux of the solar flare neutrino depends on the releasing energy and the location, where solar flares occur on the surface of the Sun. To minimize the background for the solar flare neutrino searches, data of solar satellites (GOES, RHESSI, and Geotail) were analyzed and windows for solar flare neutrino searches on the visible side were defined. On the other hand, Coronal Mass Ejection event catalogs were used to determine the search windows for solar flare neutrinos on the invisible side of the Sun. The Super-Kamiokande (SK) is the world's largest underground water Cherenkov detector in Japan. The SK experiment has been started in 1996 and its data set covers the period of solar cycles 23 and 24. In this presentation, the results of solar flare neutrino searches using data set from 1996 to 2018 are presented according to arXiv:2210.12948.

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Classification de Session: Poster session