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Development of a neutrino detector capable of operating in Space

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The nSOL experiment to operate a neutrino detector close to the Sun is building a small test detector to orbit the Earth to test the concept in space. This detector concept has to provide a new way to detect neutrinos unshielded in space. A double delayed coincidence on Gallium nuclei that have a large cross section for solar neutrino interactions convert it into an excited state of Germanium,which decays with a well-known energy and half-life. This unique signature permits operation of the detector volume mostly unshielded in space with a high single particle counting rate of gamma and cosmic ray events. The test detector concept which has been studied in the lab and is planned for a year of operations orbiting Earth which is scheduled for launch in late 2024. It will surrounded by an active veto and shielding will be operated in a polar orbit around the Earth to validate the detector concept and study detailed background spectrums that can fake the timing and energy signature from random galactic cosmic or gamma rays. The success of this new technology development will permit the design of a larger spacecraft with a mission to fly close to the Sun and is of importance to the primary science mission of the Heliophysics division of NASA Space Science Mission Directorate, which is to better understand the Sun by measuring details of our Sun's fusion core.

Collaboration

Neutrino Solar Orbiting Laboratory experiment

Primary author: SOLOMEY, Nickolas

Presenter: SOLOMEY, Nickolas

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