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The SNO+ experiment: current status and future prospects

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SNO+ is a large liquid scintillator based experiment that re-uses the Sudbury Neutrino Observatory detector. The detector, located 2 km underground in a mine near Sudbury, Canada, consists of a 12 m diameter acrylic vessel which will be filled with 780 tonnes of liquid scintillator.

The main physics goal of SNO+ is to search for the neutrinoless double-beta (0n2b) decay of 130Te. During the double-beta phase, the liquid scintillator will be initially loaded with 0.3-0.5% natural tellurium. A sensitivity on the effective Majorana neutrino mass of 55-130 meV is expected in a 5-year run. Designed as a general purpose neutrino experiment, SNO+ can additionally measure the reactor neutrino oscillations, geo-neutrinos in a geologically-interesting location and watch supernova neutrinos. Furthermore, the low energy threshold of SNO+ allows to measure low energy solar neutrinos, like pep and CNO. The pep neutrinos are monoenergetic with a very well predicted flux. A precise measurement of this flux can probe the Mikheyev, Smirnov and Wolfenstein (MSW) effect of neutrino mixing as well as alternate models like Non Standard Interactions. The measurement of the CNO neutrino flux could be used to solve the problem related to the solar metallicity, i.e. the homogeneous distribution of elements heavier than helium in the Sun.

A first commissioning phase with the detector filled with water will begin soon, while the scintillator phase is expected to start after few months of water data taking. The 0n2b decay phase is foreseen for the 2017.

After a brief description of the detector status and the various physics topics covered by SNO+, this talk will focus on the solar and supernova neutrino measurements.

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