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SNO+ Experiment: Commissioning and Status

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The SNO+ experiment is a large-scale liquid scintillator detector re-using the major infrastructure from the completed Sudbury Neutrino Observatory experiment (SNO) at Vale's Creighton Mine near Sudbury, Canada. The original SNO 12 m diameter acrylic vessel has a hold-down net installed to counter the buoyancy of filling the detector with 780 tonnes of Linear Alkyl Benzene (LAB) within the water-shielded cavity 2 km underground. The experiment re-uses the original 9500 spherically mounted PMTs with refurbished electronics and trigger system and a new DAQ. The high light-yield of LAB, together with a state of the art scintillator purification plant, will realise a multipurpose neutrino detector with low background and low energy threshold. The primary physics goal is the search for neutrinoless double beta decay ($0\nu\beta\beta$) of ^{130}Te to investigate the Majorana nature of neutrinos and the neutrino mass. Tellurium has a large 34% isotopic abundance of ^{130}Te, and using novel metal loading chemistry, about seven tonnes of telluric acid will be added to achieve an initial detector loading of almost 0.5% tellurium, with about 1330 kg of ^{130}Te. With several years of data taking it is then expected to reach a Majorana mass sensitivity between 36-90 meV, and recent R&D provide methods for higher loadings of several percent Te for future phases of SNO+ to reach the bottom of the inverted mass hierarchy. Both before and after the $0\nu\beta\beta$ phase the pure scintillator fill has a rich program in physics, including the measurement of solar ^{8}B, *pep* and CNO neutrinos, reactor anti-neutrinos, and geological anti-neutrinos, in addition to continuous supernovae sensitivity. Currently the detector is filled with water and taking interesting water-fill physics data. I will present an update on the detector status and current commissioning activities and the scintillator filling schedule for the detector.

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