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^{16}N Source for the Calibration of SNO+

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SNO+ is a multi-purpose neutrino experiment aiming to explore the unknown properties of neutrinos. The main physics goal of SNO+ is to explore whether the neutrinos are Majorana-type particles by searching for neutrinoless double beta decay of ^{130}Te. The whole experiment can be divided into three stages: first the water phase, then the scintillator phase and finally the tellurium-loaded scintillator phase searching for neutrinoless double-beta decay.

The SNO+ detector is currently filled with water and has been turned on for the water phase operation for months. In order to calibrate the detector, an ^{16}N calibration source inherited from the SNO experiment is scheduled to be deployed. The ^{16}N source mainly emits 6.1 MeV γ-rays which interact with the water in the detector. The tagged ^{16}N events can be used to optimize the position and direction reconstruction algorithms and to estimate the energy response of the detector.

We apply the current SNO+ reconstruction algorithms to the old SNO ^{16}N calibration data and the corresponding Monte Carlo simulations to check the position reconstruction and direction resolutions of the SNO+ algorithms. The results are comparable to those from SNO. A SNO+ energy response processor is also tested by using the old SNO data and the simulations.

By comparing the simulation results with the SNO data, we can estimate the systematic certainties given by the current SNO+ algorithms.

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