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From SNO to SNO+: the multiple upgrades of the neutrino experiment

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SNO+ is a multi-purpose neutrino experiment in construction in the deepest underground laboratory: SNOLAB, Canada. It succeeds to the SNO experiment by replacing heavy water by liquid scintillator, thus lowering the sensitivity threshold to a lower energy. Loading the liquid scintillator with O(t) of Nd will enable the search for neutrinoless double beta decay with an expected sensitivity to the effective neutrino mass of 100-200 meV after 3 years. SNO+ also aims at studying the pep and CNO solar neutrinos, detect geo-, reactor and possibly supernova neutrinos.

After introducing these physics goals, I cover the key upgrades from SNO to SNO+ that will allow, using the same infrastructure, to build a very different and versatile experiment. These upgrades concern all aspects of the experiment. The internal acrylic vessel containing the liquid scintillator must be cleaned, and also held down to make up for its buoyancy in the surrounding water shield. The electronics and DAQ system underwent significant changes, allowing for a redesigned trigger and larger data rate capacity. An underground purification plant will ensure that all the liquids of the experiment will reach and maintain a very high level of radiopurity. I'll also discuss in detail the calibration programme that has been redeveloped for SNO+ and must at all time keep in mind these radiopurity requirements.

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