HEP 2013
Stockholm
18-24 July 2013

Contribution ID: **882** Type: **Talk presentation**

SNO+

Saturday, 20 July 2013 11:00 (15 minutes)

One of the most important open questions in neutrino physics is the question of whether neutrinos are Majorana or Dirac particles. Attempts to detect the (possible) Majorana nature of neutrinos focus around the double beta decay process. If neutrinoless double beta decay were observed, it would not only prove that neutrinos are Majorana particles, but it would also provide a measurement of the neutrino mass. Loading the double beta decay isotope 130Te into the SNO+ liquid scintillator has the potential to allow for an extremely powerful double beta decay search. We have developed a brand new technique to do this, and to remove other contaminants that might otherwise interfere with the measurement. Although the energy resolution of the detector will not be as good as that of other existing experiments, the amount of isotope that could be suspended in the scintillator is very large. This means that SNO+ can hope to see a large enough number of neutrinoless double beta decay events that we can fit to the energy spectra of the 2 neutrino and 0 neutrino signals (and those of the radioactive backgrounds), making us much less dependent on energy resolution than competing experiments. In fact, based on some preliminary simulations, if we loaded the scintillator with 0.3% natural Te (which would contain 800kg of 130Te isotope) we would be able to detect neutrinoless double beta decay at neutrino masses approaching the range of the "inverted hierarchy,"a particularly interesting regime for theoretical predictions related to one of two possible ways for the 3 neutrino masses to be ordered. A 3% loading, corresponding to 8 tons of 130Te isotope in the detector, would give us the potential to probe the majority of this interesting range with high sensitivity.

Primary author: MOTTRAM, Matthew (U. of Sussex)

Presenter: MOTTRAM, Matthew (University of Sussex)

Session Classification: Neutrino Physics

Track Classification: Neutrino Physics