ABSTRACT

Neutrinoless double-beta decay searches play a major role in determining the nature of neutrinos, the existence of a lepton violating process, and the effective Majorana neutrino mass. Neutrino oscillation experiments have demonstrated that neutrinos have mass but the ordering of the masses and the absolute mass scale are yet unknown. The rate of neutrinoless double-beta decay is proportional to the effective Majorana neutrino mass and when combined with the global neutrino oscillation experiments would set the absolute mass scale. The neutrinoless double-beta decay process also requires the neutrino to be indistinguishable from the anti-neutrino and lepton number violation.

There has been significant experimental progress to date utilizing a range of techniques to detect double-beta decay. Within the next five years, several experiments will be able to confirm or refute a recent controversial claim of neutrinoless double-beta decay. In 5-10 years, double-beta decay experiments will probe the exciting mass region indicated by atmospheric neutrino mixing.