

論文内容の要旨

Search for Nucleon Decay into Charged Antilepton plus Meson in Super-Kamiokande

(スーパーカミオカンデにおける荷電レプトンとメソンへの核子崩壊の探索)

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Systematic searches for nucleon decays into a charged anti-lepton (e^+ or μ^+) plus a light meson (π^0 , π^- , η , ρ^0 , ρ^- , ω) were performed. Twelve nucleon decay modes were analyzed. The total exposure is 140.9 kiloton-year exposure which includes a 91.7 kiloton-year (1489.2 live days) of Super-Kamiokande-I and a 49.2 kiloton-year (798.6 live days) of Super-Kamiokande-II.

The number and the feature of candidate events are consistent with the atmospheric neutrino background expectation. We did not observe statistically significant evidence for the nucleon decay. Thus, the lower limits of nucleon partial lifetime at 90% confidence level were obtained for all the studied modes. The lifetime limit for the $p \rightarrow e^+\pi^0$ mode is set to be $\tau/B(p \rightarrow e^+\pi^0) > 8.2 \times 10^{33}$ years, which is 5 times longer than the current best limit. For the other modes, their lifetime limits range from 3.6×10^{31} to 6.6×10^{33} years depending on the decay modes. The more stringent limits than the current best limits are set for ten modes in the twelve searched modes.