

# Double beta decay and matter dominated universe

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Study of neutrino-less double beta ( $0\nu\beta\beta$ ) decay becomes of particular importance after the confirmation of neutrino oscillation which shows that neutrinos have mass. They could then be Majorana particles which violate lepton number conservation. Once lepton number non-conservation is verified, we have a scenario to explain how our matter dominated universe is realized dynamically. It is the leptogenesis combined with CP violation in lepton sector.  $0\nu\beta\beta$  decay is only a known process to verify Majorana nature of neutrino.

We have developed the CANDLES detector system for the study of  $48\text{-Ca}$   $0\nu\beta\beta$  decay. The  $48\text{-Ca}$  has the highest  $Q$  value (4.3 MeV) among double beta decay nuclei. It means that the large decay rate for a given neutrino mass and the least background. We constructed a detector at the Kamioka underground laboratory. I will describe the current status of this research in the world and our experiment.