

Current status and future prospects of KamLAND-Zen experiment

jeudi 19 juillet 2018 09:30 (30 minutes)

KamLAND-Zen searches for neutrinoless double beta decay of Xe-136 using Xe-loaded liquid scintillator(XeLS). The experiment holds XeLS in the nylon-film vessel(inner balloon, IB) at the center of KamLAND, low-background 1-kton liquid scintillator detector. First stage of the experiment, KamLAND-Zen 400 (Zen 400), has run with 380-kg of Xe until 2015 and its result set the most stringent upper limit on effective Majorana neutrino mass.

Now we are moving on to KamLAND-Zen 800 (Zen 800) holding 750-kg of Xe in a new larger IB. Construction of IB has finished on March 2018 and its installation in KamLAND on May 2018. We are now monitoring the status of the new IB with Xe-less liquid scintillator (dummy LS). After confirming non-defect in the IB and cleanliness of LS and IB, we will replace dummyLS with XeLS and start physics run.

R&D for the future project, KamLAND2-Zen, which aims to cover the inverted-mass hierarchy region is also ongoing. High quantum efficiency photomultiplier, light collecting mirror, and brighter liquid scintillator are being studied for improving energy resolution in order to reduce two-neutrino double beta decay background. New electronics for more efficient reduction of muon-spallation background is also in development.

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Classification de Session: Future projects