

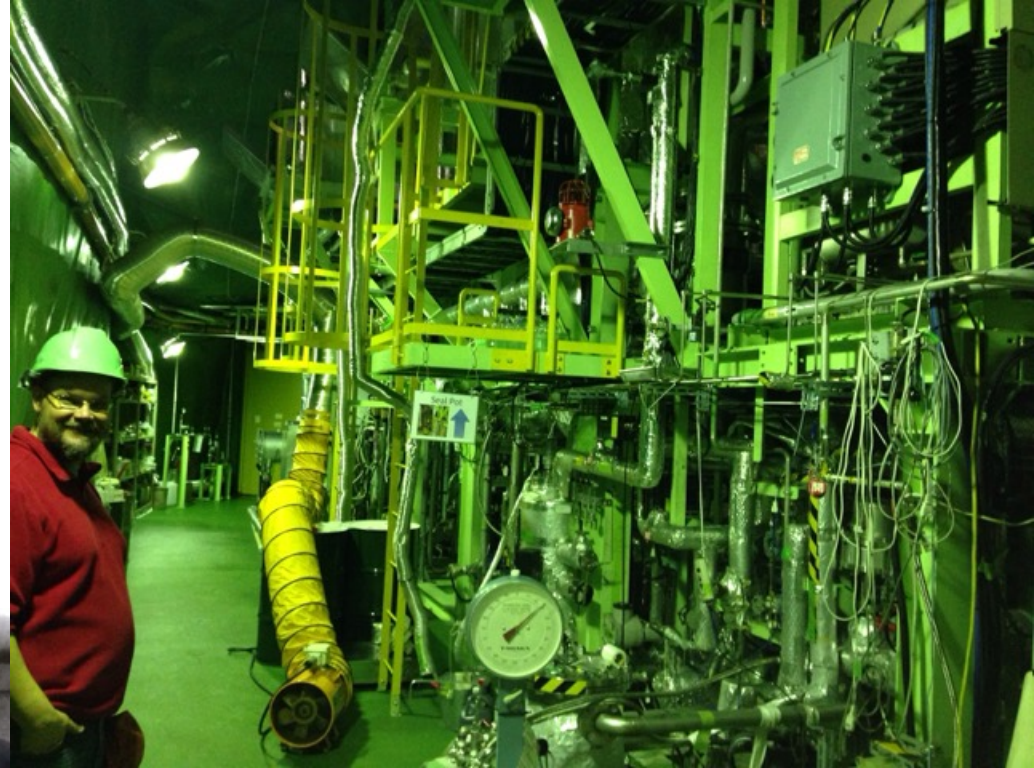
KamLAND tour



Entrance of Kamioka mine, with a large sign of “Congrats Kajita”

Bruce Berger (former T2K) kindly showed around KAmLAND outer detector refurbishment work.

KamLAND liquid scintillator (LS) distillation facility for purification. LS is mineral oil (dodecan) based pseudocumene (PC, primary) and PPO (secondary). Boiling point is from higher to lower, PC → dodecan → PPO. Since PPO is powder in room temperature, you need to keep hot. Left over will be impurity and removed.



Distillation facility is kind of far away from the detector, and people worry the contamination of radon from the air through the connections of plumbing, so all pipe connections are secured by hand-made plastic cover.

A model of inner detector piece. New (old?) PMT has a shadow to cover side of the window to make photo-cathode smaller to improve the timing.

Outer detector. Outer detector is defined by tyvek sheet (optical separation), and the cavern itself is a rock with mine spray... Scaffolding is to remove PMTs from the outer detector.



KamLAND waterfall (leak of outer detector). Every water detectors leak!



Xenon purification facility for KamLAND-Zen. Main impurity is nitrogen. Each bottle contains 20kg of Xe 136 from Russia. 1kg of Xe 136 is \$15k, so the bottle is ~\$300k, and just 3 of them in this pic is almost \$1M!

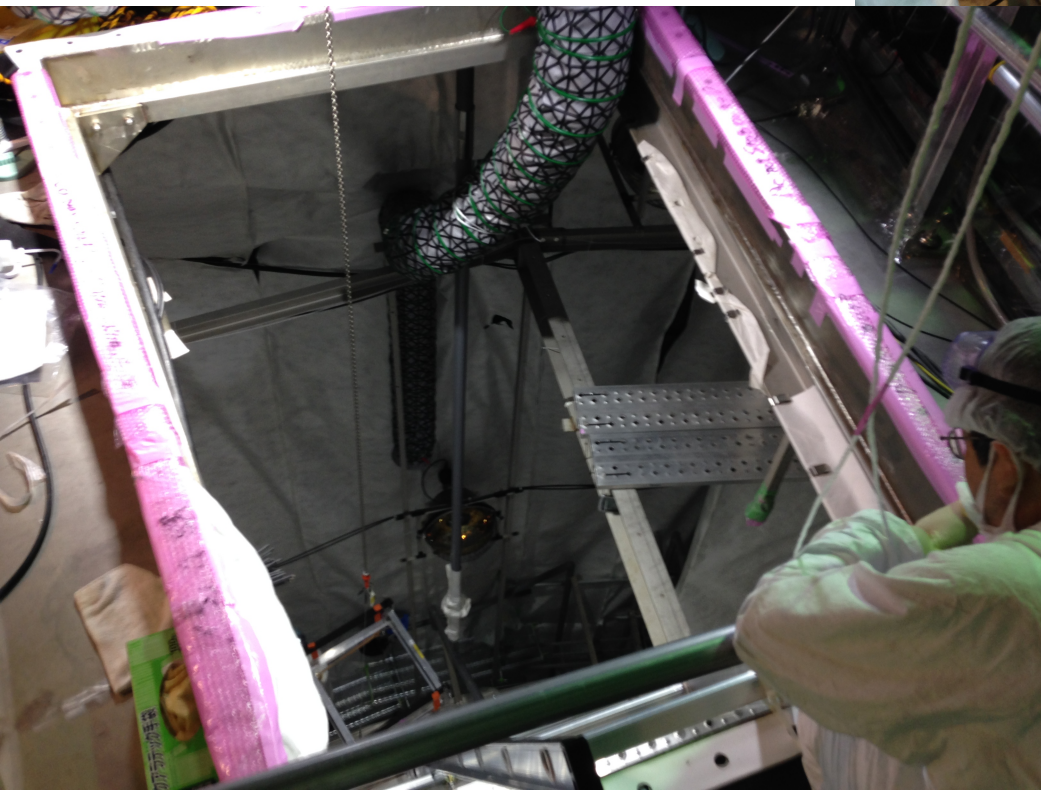


Top of outer detector, lots of people with lots of activities...

Inner detector Teflon jacket cables (because they go in the oil?)



Main work is to replace old outer detector 20-inch PMTs with new ones (higher QE).



Lowering PMT by pulley to the person in outer detector region