The 21 Century COE Project Exploring New Science by Bridging Particle-Matter Hierarchy

Short-term Foreign Researchers

Research Report

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Your Stay Period in Japan: From <u>March 9, 2004</u> to <u>March 23, 2004</u> Title of Research in Japan: Reactor neutrino oscillation experiments

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Please write a research report of one or more pages and submit it with this cover to your host researcher till the end of this March.

My activities in Japan mainly concerns to the following two parts:

KamLAND neutrino oscillation experiment

KamLAND is a large liquid scintillator detector designed to study solar neutrino problems by using reactors neutrinos from all over Japan. This is a Japan-US-China collaboration, with a total of about 100 physicists from 12 institutions.

During my stay in Japan, I worked on the detector maintenance and took shift to take data and monitor the continuous running of experimental apparatus. The effort of taking shift is vital to the success of experiment since good physics results depending on the high quality data, which needs a great care to cure possible problems of the apparatus and a detailed log of of the environmental conditions and status of the detector.

Future experiment about the $\sin^2 2\theta_{13}$

Measuring $\sin^2 2\theta_{13}$ is a very important experiment and several proposals in the world are being discussed, including one in Japan. I participated the workshop held in Niigata in March 20-22 and gave a talk with the title "Measuring $\sin^2 2\theta_{13}$ at the Daya Bay Nuclear Reactors". I described in detail the Chinese proposal for such an experiment, its goal, analysis of past experience, the detector design, Monte Carlo simulation, background estimate, optimum baseline and a description of the Daya Bay nuclear power plant. I also had many discussions with colleagues, including Prof. F. Suekane of Tohoku University, about the design of this experiment, including the detector geometry, backgrounds and systematic errors. Possible future collaborations are also discussed.