

# ICEHAP Seminar

Sep. 5th, Thursday, 2pm, 2014

place: Fac. of Sci. Bldg 2, 2F, room No.209

**Dr. Masaki Ishitsuka,**

**(Tokyo Institute of Technology)**

**"Improved measurements of  $\theta_{13}$  and  
reactor energy spectrum by the  
Double Chooz experiment"**

## abstract

Improved measurements of the neutrino mixing angle  $\theta_{13}$  from the Double Chooz experiment will be presented. Double Chooz updated the measurement recently using the data collected in 467.90 live days by the far detector positioned at a distance of 1050m from Chooz reactor cores in France. We have developed several novel techniques to reduce the backgrounds and systematic uncertainties with respect to the previous publications. In contrast the efficiency of the reactor neutrino signal has increased. The background rate is directly measured by one week of the reactor-off data to be consistent with the estimation. The value of  $\theta_{13}$  is measured from a fit to the observed energy spectrum.

In addition, deviations from the reactor antineutrino prediction were observed above the prompt signal energy of 4MeV and the same feature was confirmed later by other reactor neutrino experiments. Possible explanations of the prediction are also presented.

A consistent value of  $\theta_{13}$  is obtained from a fit to the observed rate as a function of the reactor power independently of the spectrum shape and background estimation, demonstrating the robustness of the  $\theta_{13}$  measurement despite the observed distortion.