

# RCNP, OSAKA UNIVERSITY NUCLEAR PHYSICS SEMINAR

Title            EMPHATIC, a hadron interaction experiment at Fermilab  
Speaker        Akira Konaka TRIUMF/RCNP  
Date and Time   Dec 3rd (Mon) in 2018    13:30 - 15:00  
Place            Lecture Room 1 ( on the 6th floor of RCNP main building

Abstract: Uncertainty in hadronic interaction on nuclei is the dominant systematic uncertainty in predicting the neutrino flux for long baseline neutrino experiments and atmospheric neutrino experiments. There is a lack of comprehensive hadronic interaction data in the GeV scale. Uncertain hadronic interaction in the GeV scale also affects detector response in the collider experiments and hadron experiments. Unlike the electromagnetic and weak interactions, it is difficult to predict the hadronic interaction in the GeV scale from first principle (QCD) due to the strong coupling, and comprehensive data would be needed. We propose a hadron interaction experiment, EMPHATIC, at Fermilab test beam facility. Compared to the present and past experiments with a similar goal, such as MIPP(Fermilab), HARP(CERN), and NA49/61(CERN), EMPHATIC uses compact detector system with minimum bias trigger data taking to minimize the systematic uncertainties. The tracking is done by silicon strip detector with a permanent magnet and aerogel ring imaging cherenkov for particle identification of the secondary particles.

We had a pilot experiment with silicon tracker in January 2018, and measured precise proton-Carbon forward scattering (total, elastic, and quasi-elastic) cross sections, which have direct impact on the neutrino flux prediction of the T2K long baseline neutrino experiment. The result of the pilot experiment and the future plan of EMPHATIC will be described in this talk.

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