Poster session 3 – Wednesday 6 July

P3.024 **The NuPRISM muon neutrino disappearance and electron neutrino appearance oscillation analyses**

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NuPRISM is a proposed intermediate water Cherenkov detector for the T2K and Hyper-K long baseline neutrino oscillation experiments. The detector makes use of the off-axis effect, where the peak energy of the neutrino flux falls with increasing perpendicular distance from the neutrino beam axis. By spanning the 1 – 4 degree off-axis angular range NuPRISM can sample neutrino fluxes with peak energies from ~1200 to ~400 MeV respectively. These samples can be linearly combined to create an effective neutrino flux, such as the muon neutrino flux at the far detector for some choice of the neutrino oscillation parameters.

All current oscillation analyses use a neutrino interaction model to couple high statistics data at a near detector to the oscillated data at the far detector. This procedure assumes that the energy dependence of the different neutrino interactions is well known, and that the model can correctly predict the kinematics and multiplicities of particles coming from the interaction. To understand these processes to the percent level required for CP violation searches is a challenging proposition.

NuPRISM provides a better way of performing oscillation measurements. If the neutrino flux and nuclear target at the near and far detectors are identical then the data taken at the near detector directly predicts the oscillated far detector data, independent of any assumptions about neutrino interactions.

This poster presents the NuPRISM muon neutrino disappearance analysis, showing that this technique is unaffected by mis-modelled neutrino cross-sections, and giving the $\sin^2 \theta_{23}$ measurement accuracy for T2K Phase 2. It also presents the electron neutrino appearance analysis, showing the model uncertainty on the far detector event rate prediction compared to the current T2K analysis.