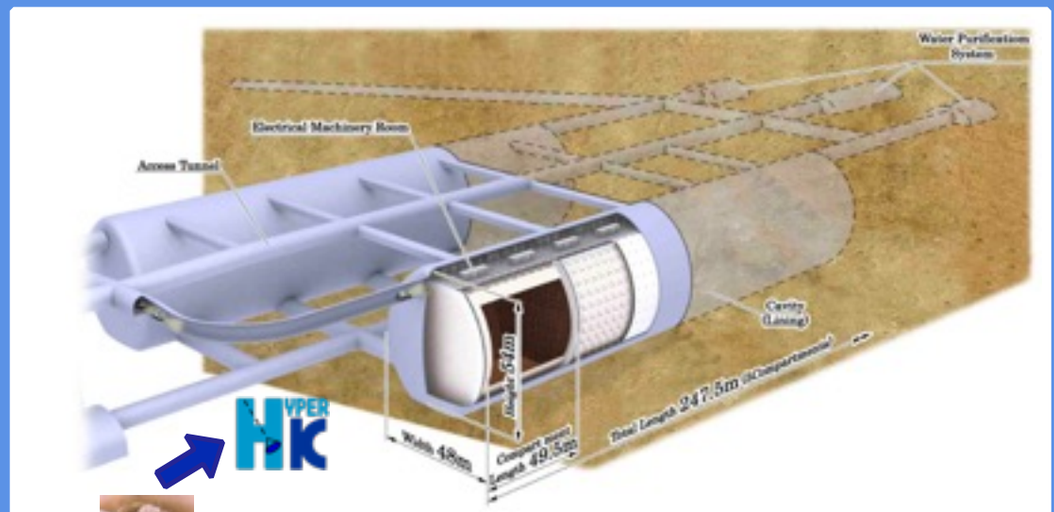
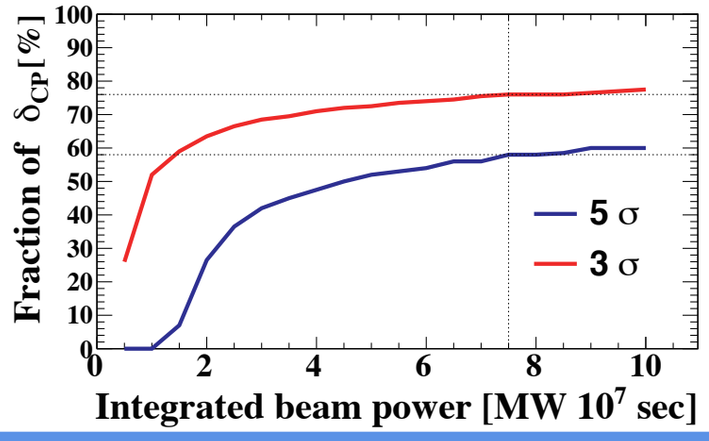
TITUS : An Intermediate Detector for the Hyper-K Experiment

THE UNIVERSITY OF WARWICK

Tokai-to-Hyper-K Experiment



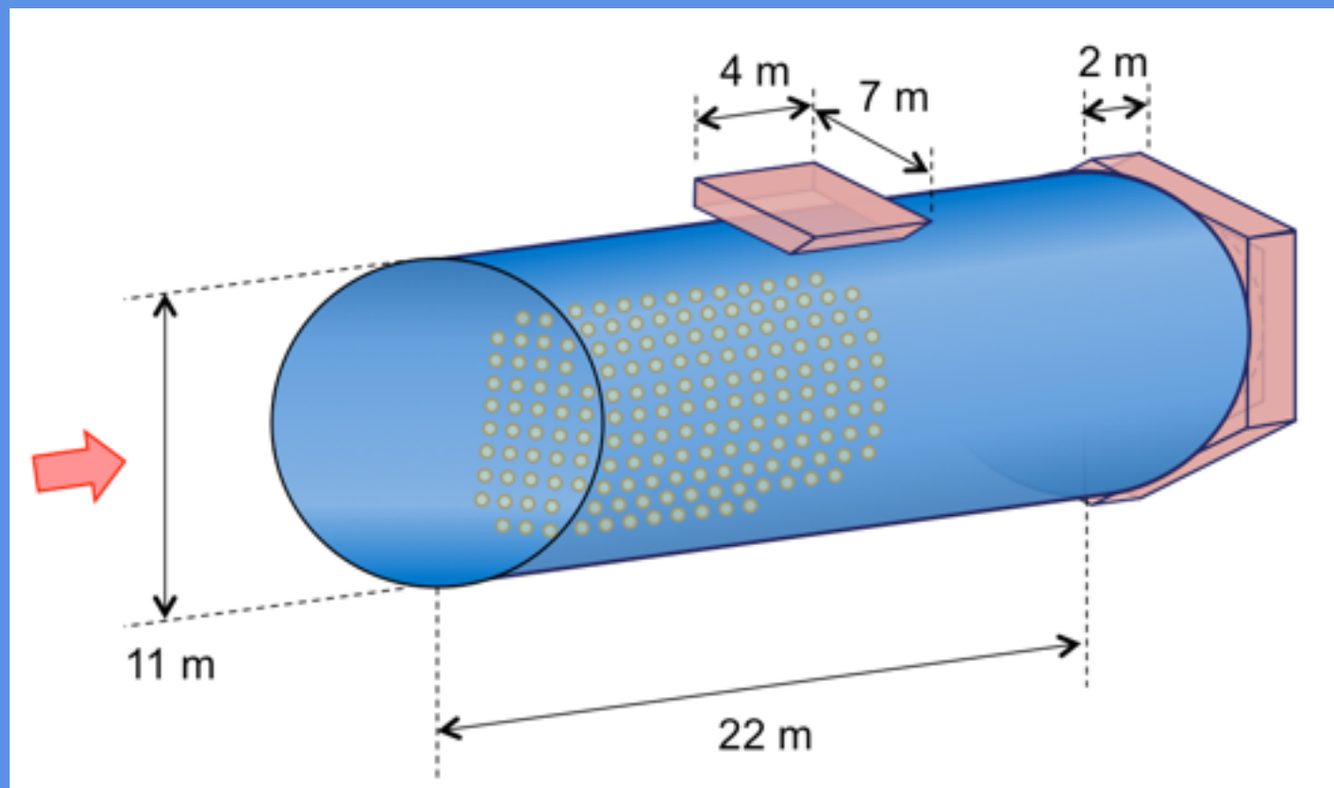
Megaton scale Water Cherenkov detector
x25 larger fiducial volume than Super-K.



Leptonic CP violation can be established at 3σ (5σ) for 76% (58%) of δ_{CP} space.

New near detectors are needed to maximise physics potential of the T2HK beam programme.

TITUS Detector Concept



A proposed Water Cherenkov Near Detector

Main features:

- 2km from the neutrino beam source to match the far detector flux.
- Identical target nucleus and detector technologies as the far detector to maximise the cancelation of systematic uncertainties.
- Neutron tagging by capture on Gadolinium.
- Magnetised Muon Range detector for sign selection and measure escaping muons.

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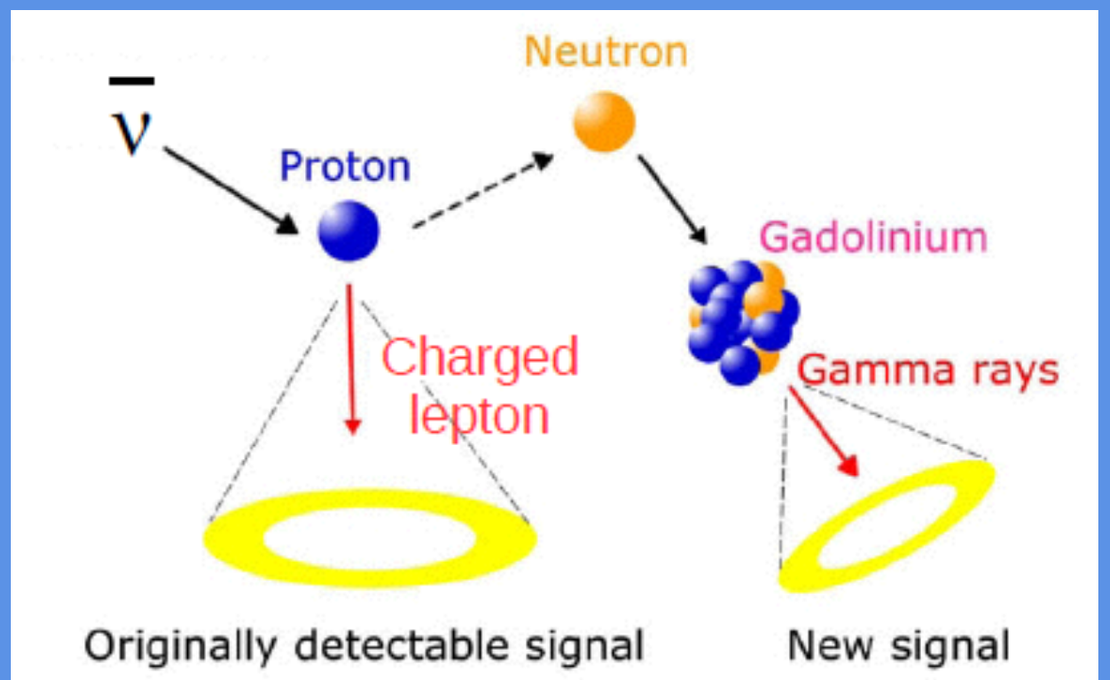
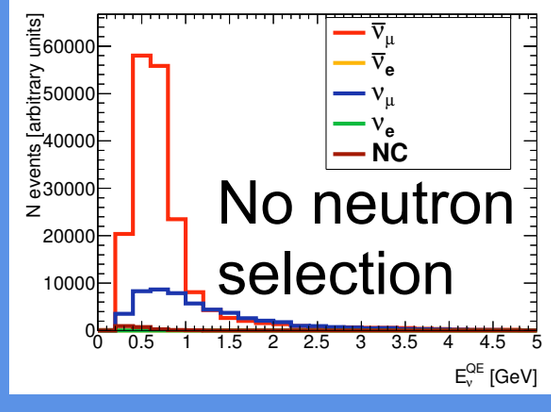
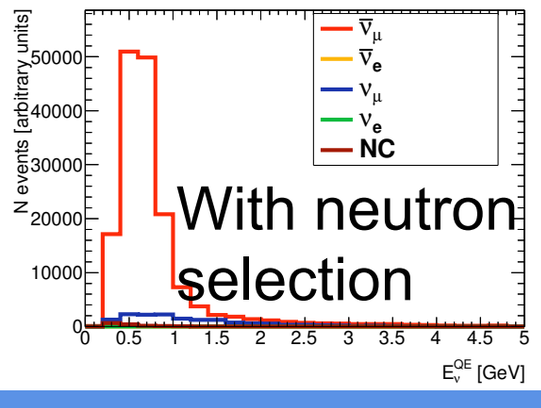
Neutron Tagging



Neutron capture on Gd produces visible gamma signal.

Neutron tagging allows neutrino-anti-neutrino discrimination.

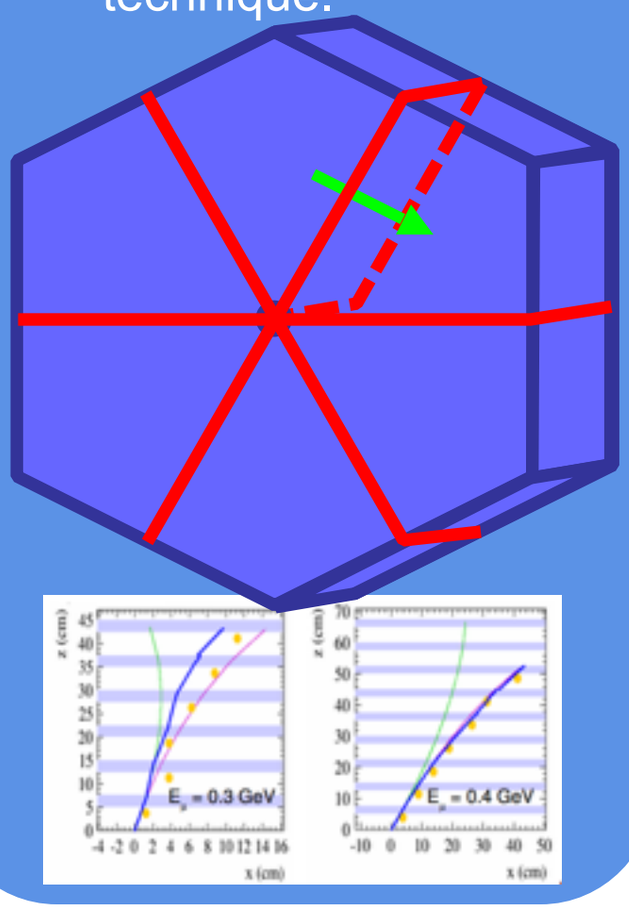




Muon Range Detector

A magnetised iron-scintillator sandwich

- measure momentum of escaping muons.
- allows sign-selection.
  - in-situ validation of the neutron capture technique.



Please find my poster if you would like to know more!

David Hadley on behalf of the TITUS working group