TRIUMF

Water Cherenkov Test Experiment

Matej Pavin,
on behalf of the WCTE collaboration

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EMPHATIC

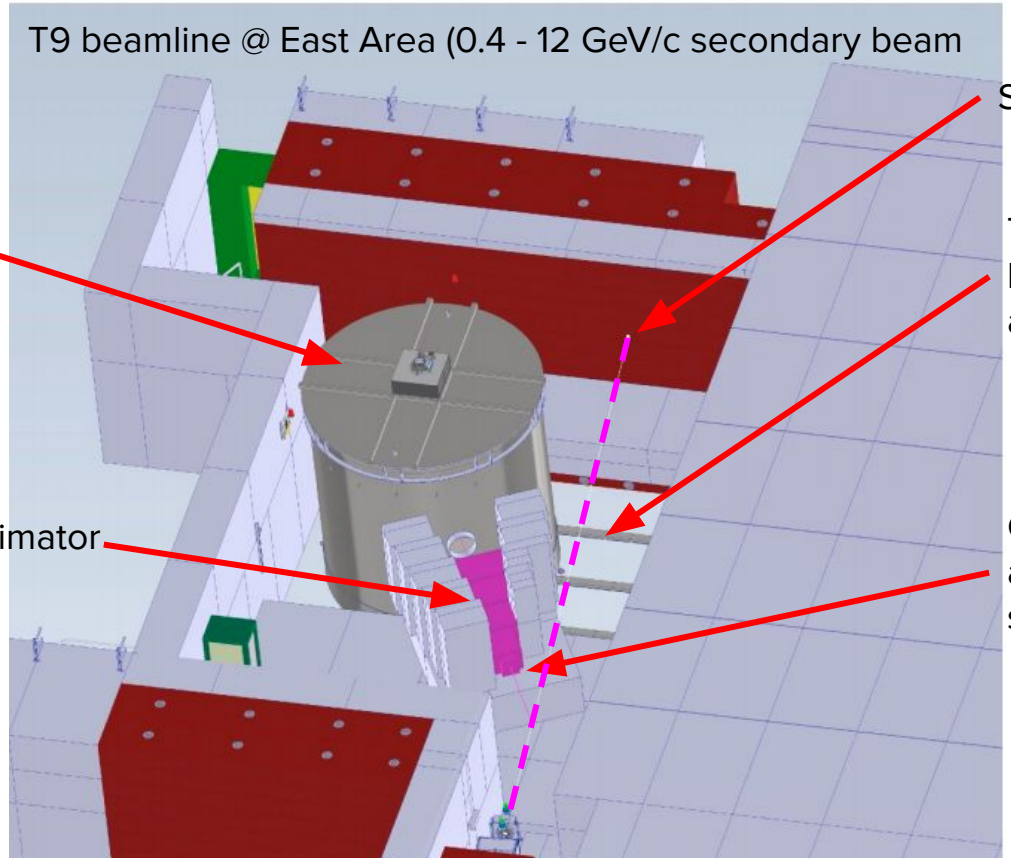
Hyper-K

Motivation

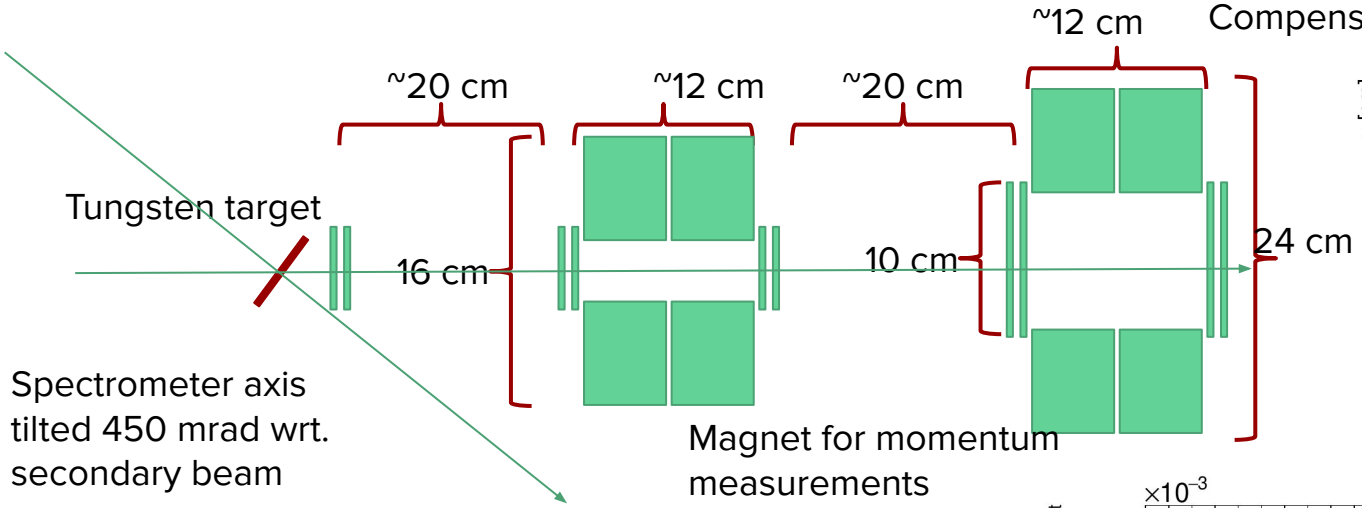
- Many existing and next-generation neutrino experiments use water Cherenkov technology
- With increase in collected data reducing systematics is of crucial importance
- Hyper Kamiokande will achieve 3% statistical error for CP violation measurements ➜ current systematic uncertainty in T2K is 6%
- Detector systematics are one of the dominant systematic contributions ➜ calibration of water Cherenkov detector
- **Water Cherenkov Test Experiment**
  - developing percent level calibration of water Cherenkov detectors
  - measuring physical processes (pion scattering in water, Cherenkov light profile, secondary neutron production)
  - testing new technologies: multi-PMT, water based liquid scintillator

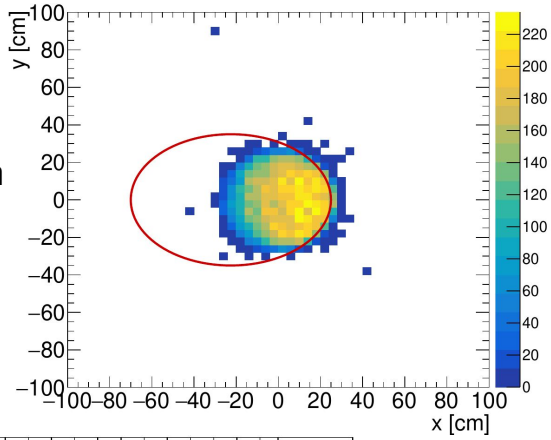
http://cds.cern.ch/record/2712416/files/?ln=en

Water Cherenkov Test Experiment (WCTE)

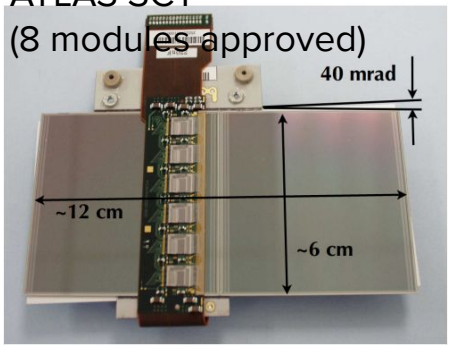


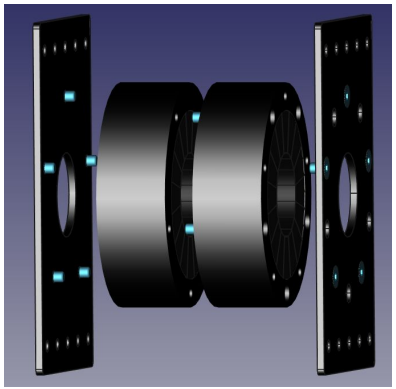
WCTE Tertiary Beam Spectrometer

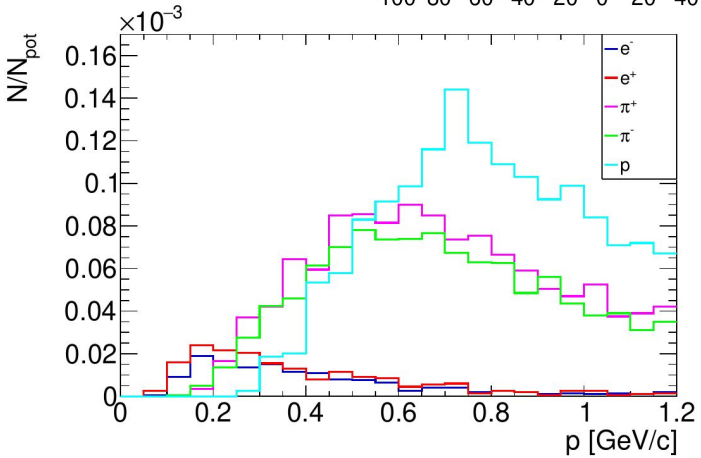




ATLAS SCT
(8 modules approved)

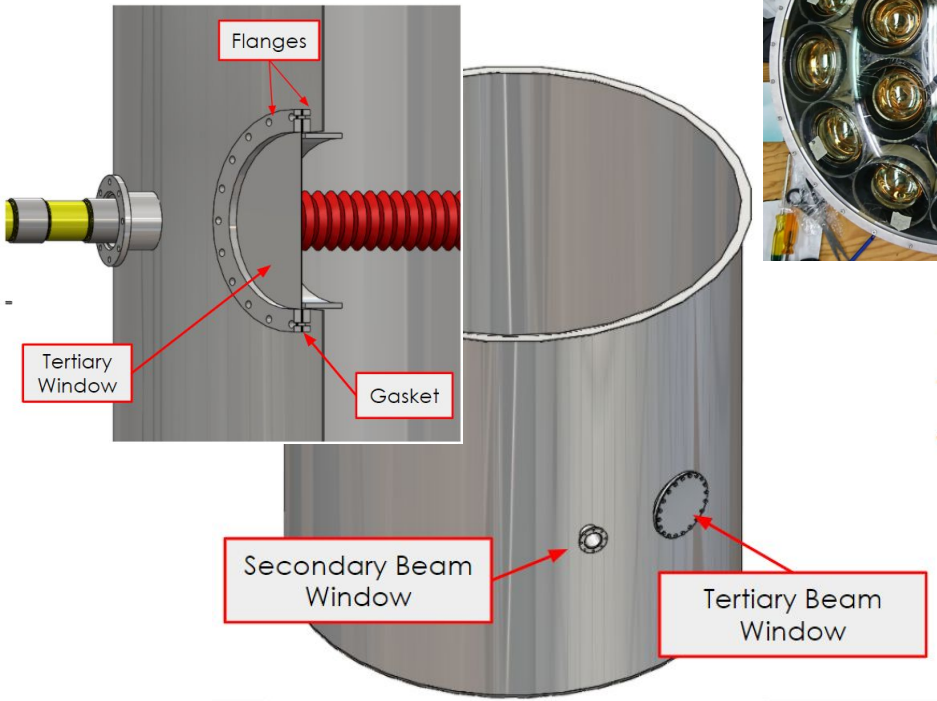






Water Cherenkov Detector

- ~4 m diameter
- 128 mPMT modules
- Two beam windows



128 mPMT modules

Conclusion

- Reducing systematics in existing and future water Cherenkov detectors is of crucial importance
- WCTE will use the 50t water Cherenkov detector to study physics processes inside the detector with a well-defined beam and develop calibration techniques
- WCTE is a platform for testing new technologies (multi PMT, WBLS, ...)