

Ideas and Opportunities for water-tank test stand

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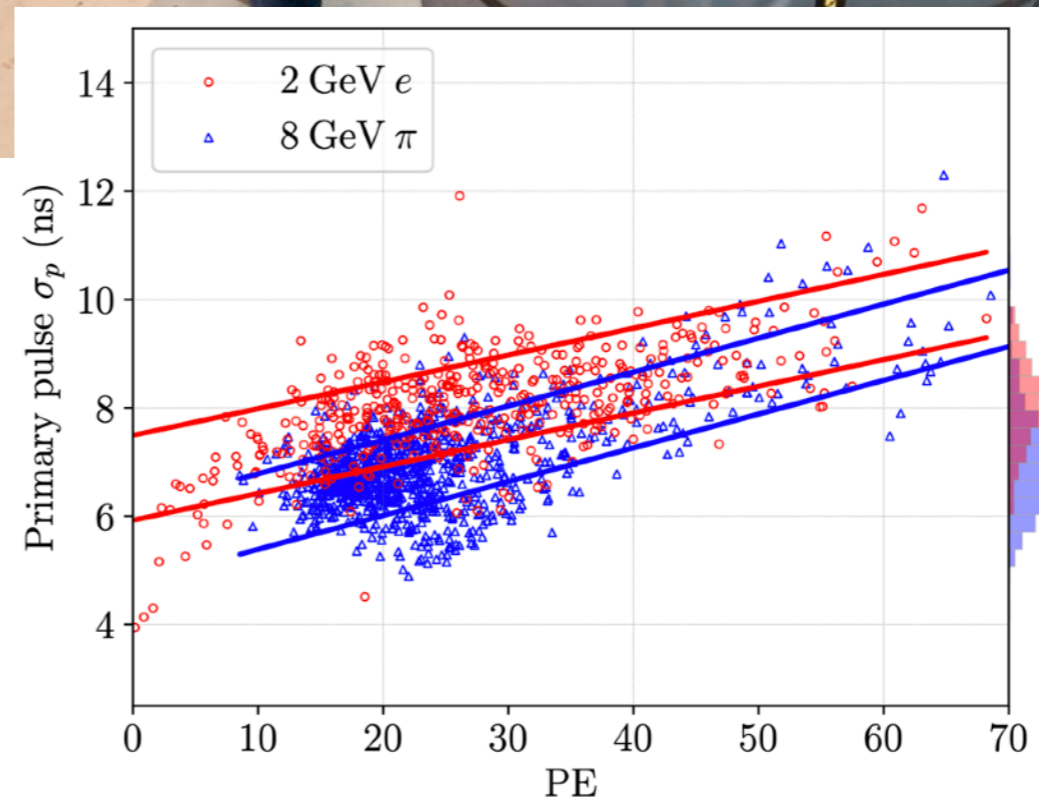
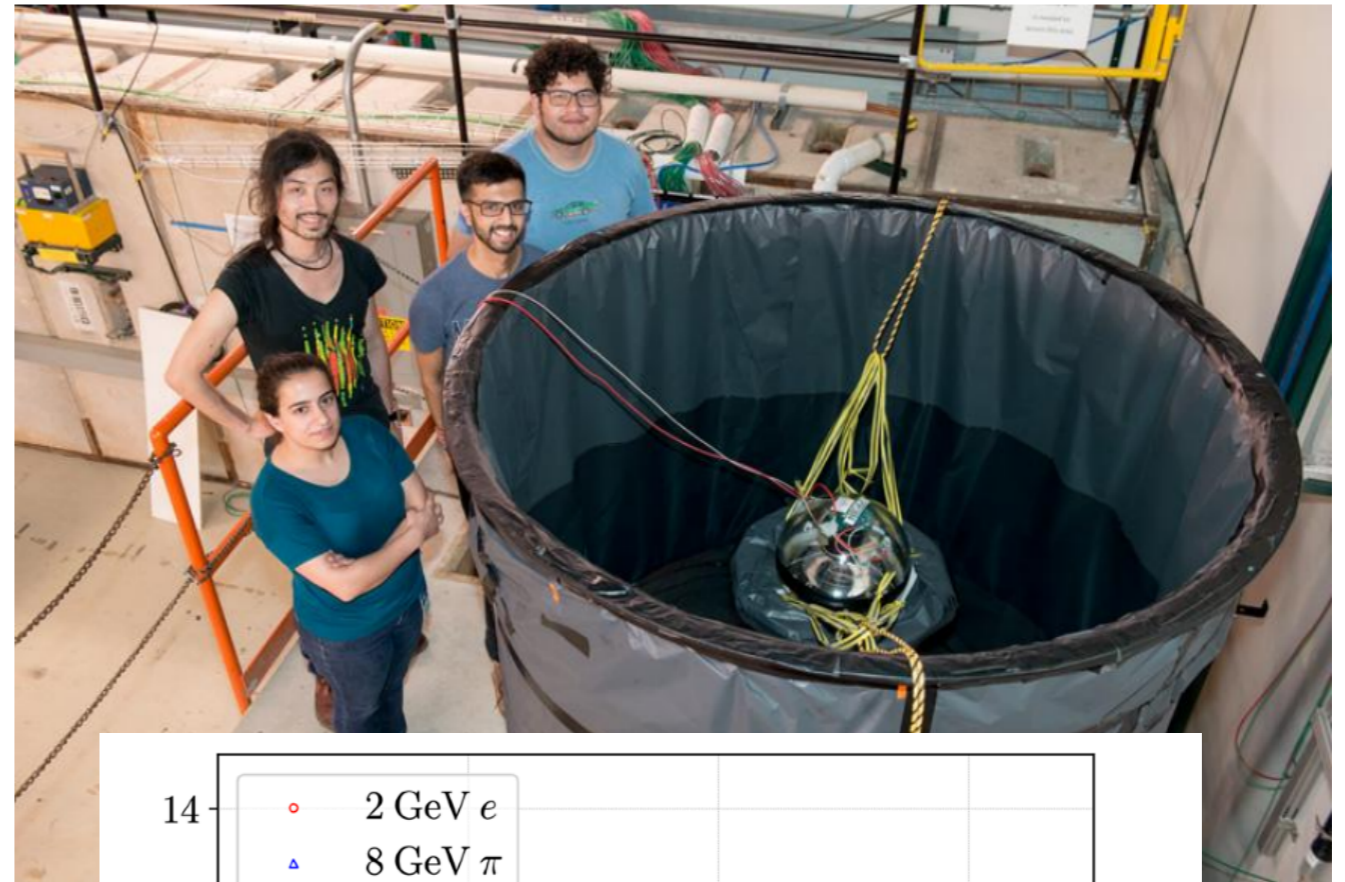
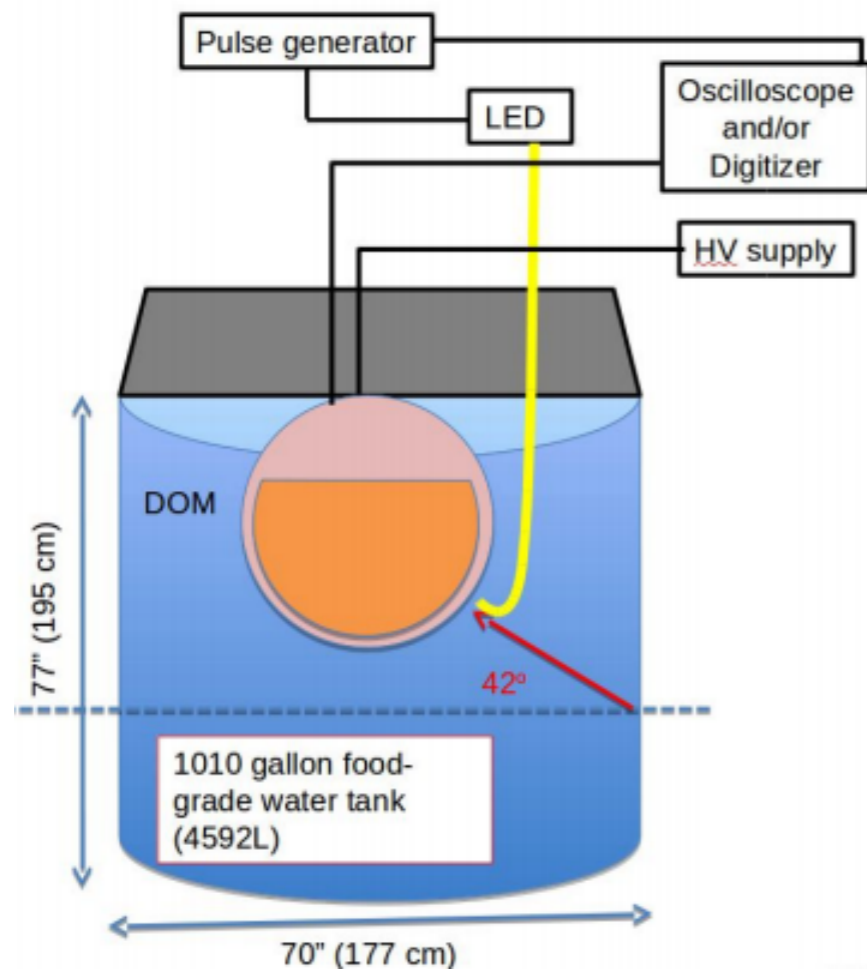
In collaboration with Janet Conrad and Teppei Katori



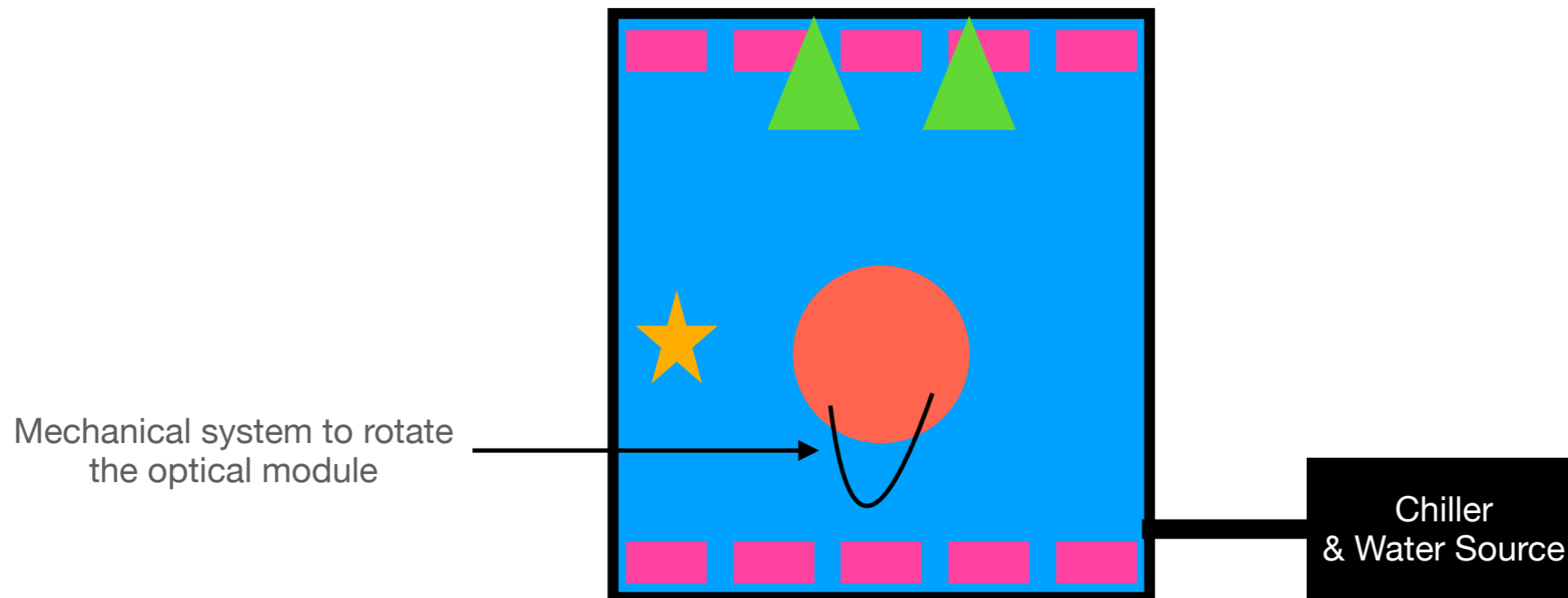
Previous work

Fermilab Test Beam study

- Black tedlar film coats the inside of tank.
- 700 gallons of distilled water.
- DOM was placed at the center using ropes.
- Monitor PMT gain using an LED.



Next Setup Concept



- Scintillator detectors to tag atmospheric muons
- Distilled water tank
- Optical module
- ▲ Calibrated light sensors
- ★ Calibrated light sources



Jeff is approximately 1.8 meters tall

The Tank

- Seawater tank available and operating at Harvard.
- Insulated and with cooling system that allows for temperatures as low as ~ 2 C.
- In a high-bay laboratory: cranes available to drop heavy equipment into the tank and out of it.

Tank upgrades

- Distilled water option.
- Design and construct system to rotate modules (DOM, mDOM, D-Egg) inside the tank.
- Improved support structures to have easier access to the tank content.
- Possibility to add light sources for calibration.

Current Project objectives

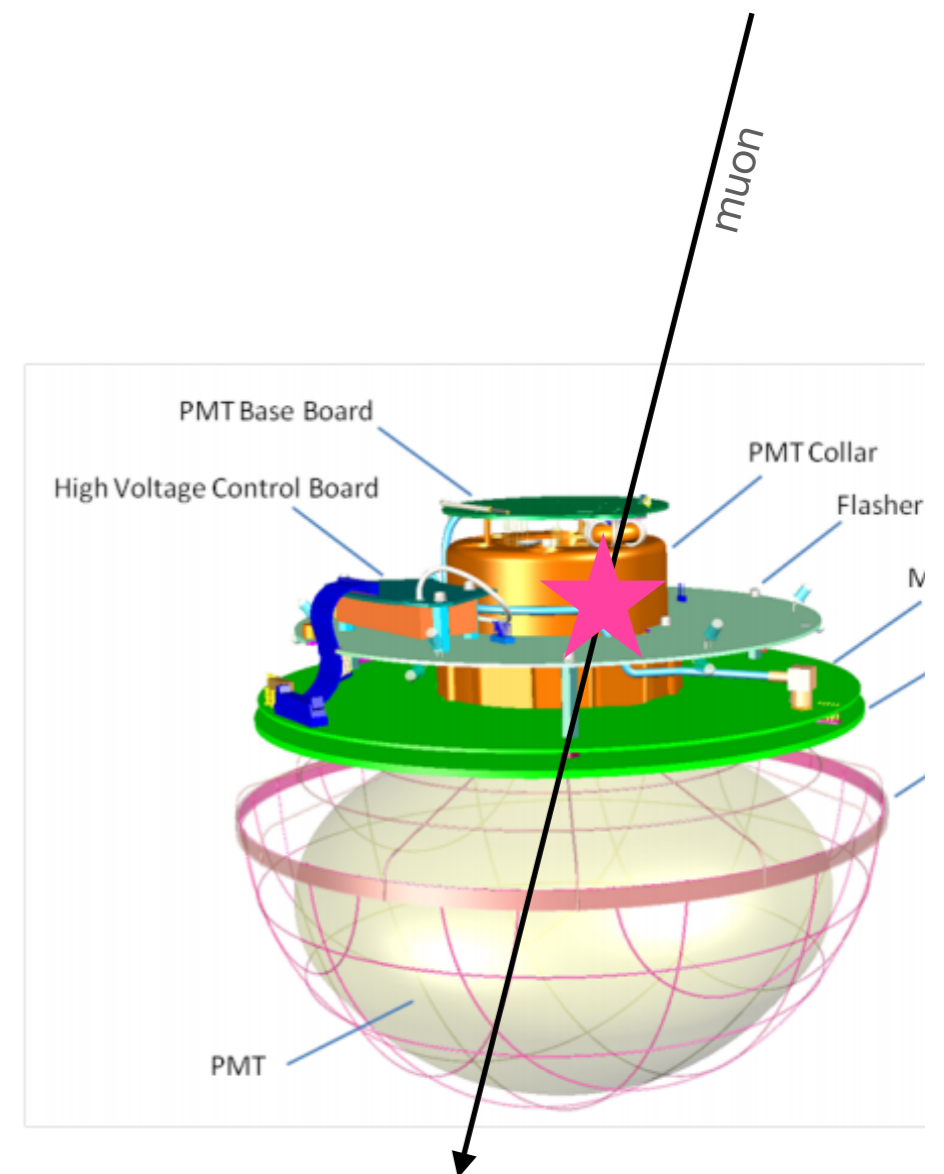
Long term Objectives:

- Long-term water Cherenkov test-stand located at Harvard.
- Available for tests and calibration measurements for for IceCube-Upgrade and IceCube-Gen2. Could also be used for other water-based detectors such as P-ONE or HyperK.

Short term goals:

- Correlate very high DOM pulses with nearby muons, with DOMs in the air and water.
- Study early hits in the waveform due to muons passing through the PMT dynodes.

We plan to look for large pre-pulses in this setup.



Target work for the IceCube-Upgrade

Measurements:

- Revisit measurement of angular emission pattern the DOM 'flasher.'
- New absolute calibration and angular distribution mDOM and D-Egg flashers.
- If flashers are used in Gen-2, we could also measure them here.

New signatures:

- If dynode-tagging works on DOMs, we will like to test this for IceCube-Upgrade modules.

**We are looking for how this setup
could be useful for Gen2**

**Comments and suggestions are
very much welcomed!**