



Performance of the Veto System for Taishan Antineutrino Observatory



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1. Physics Motivation

TAO measures reactor $\bar{\nu}_e$ spectrum with high precision

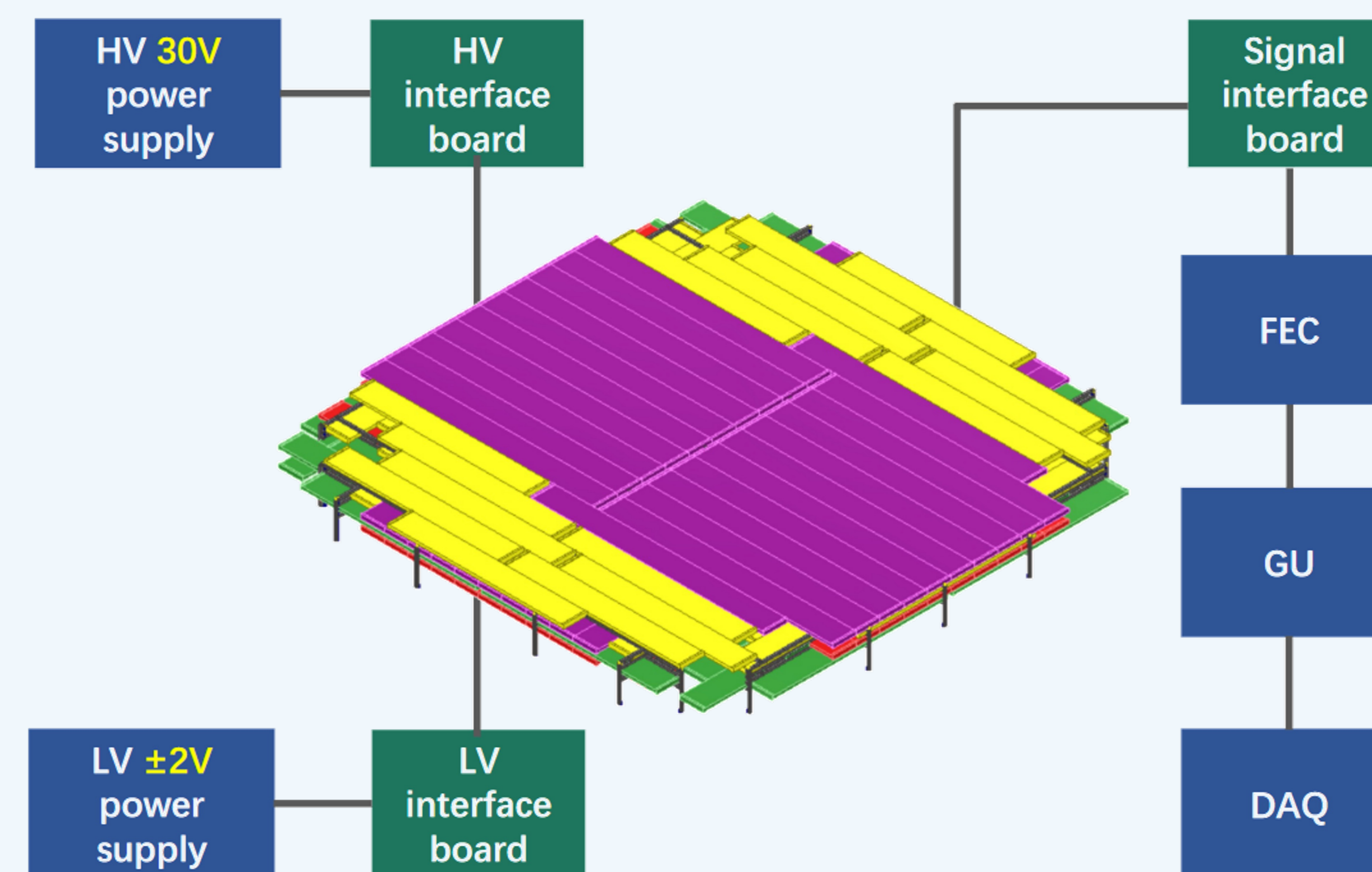
Muon induced Backgrounds:

- ▶ Fast neutrons
- ▶ Spallation β -n isotopes
- ▶ Double neutrons

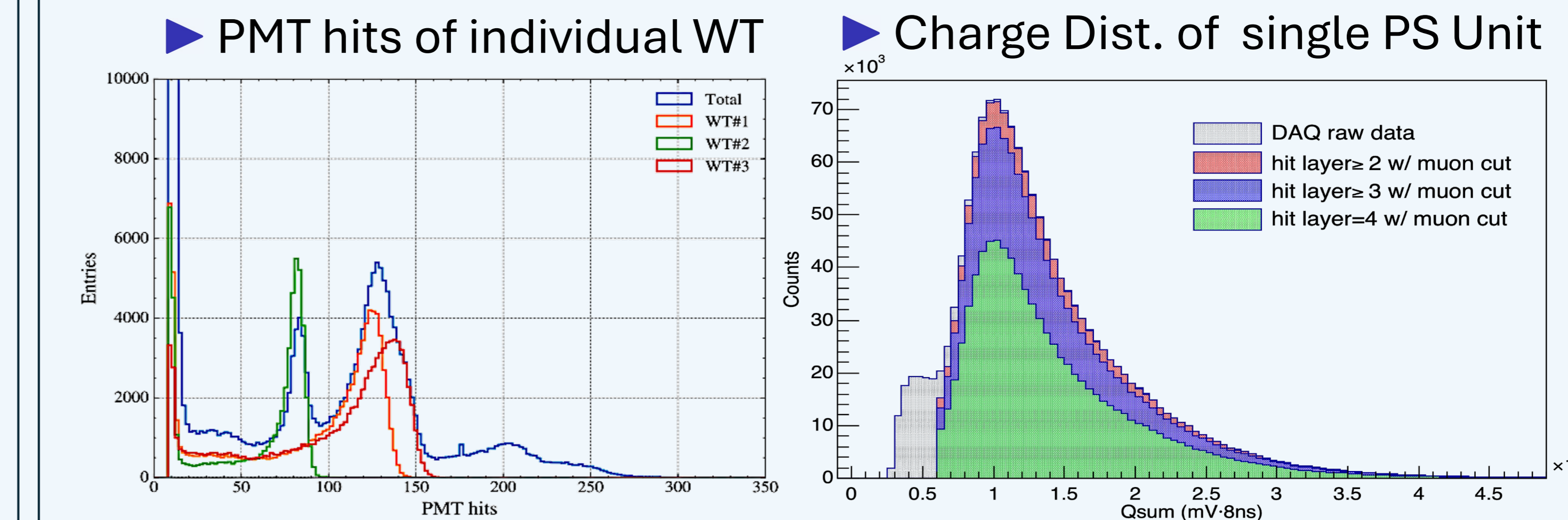
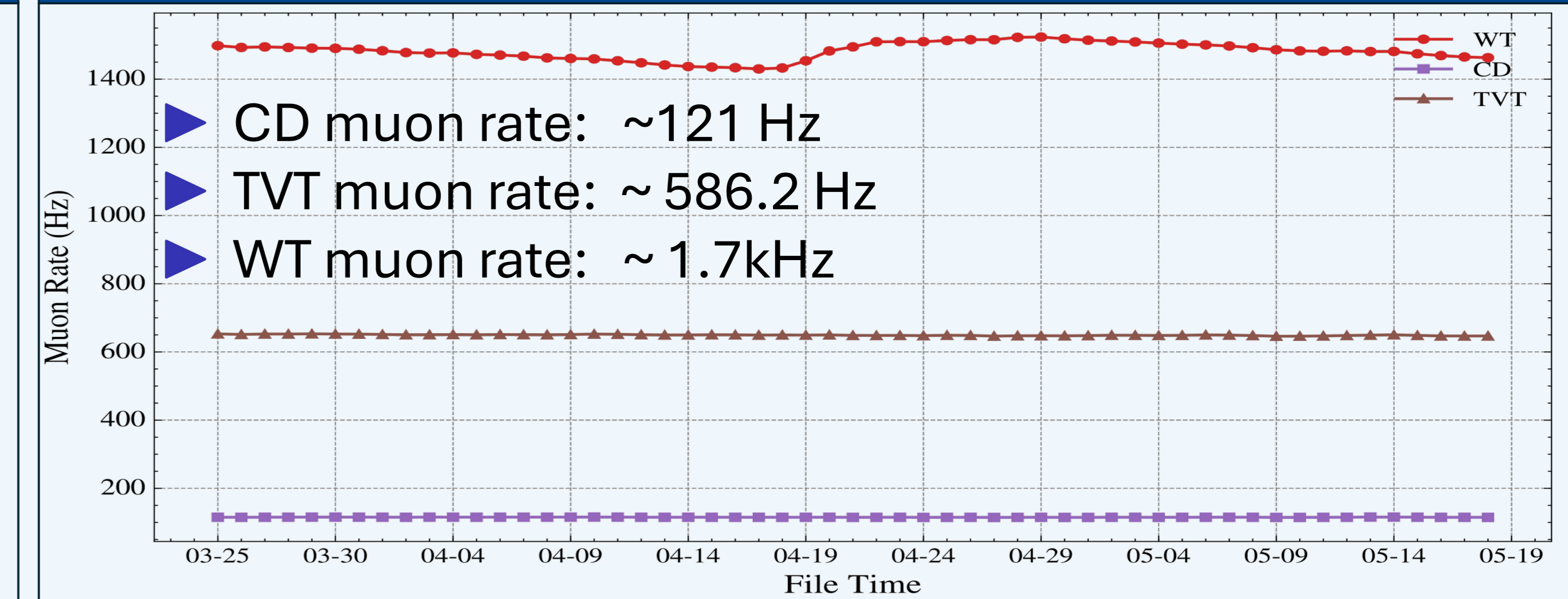
⇒ Need high muon rejection efficiency

3. Top Veto Tracker (TVT)

- ▶ 160 plastic scintillator strips
- ▶ 4-layer staggered geometry
- ▶ SiPM readout via WLS fibers

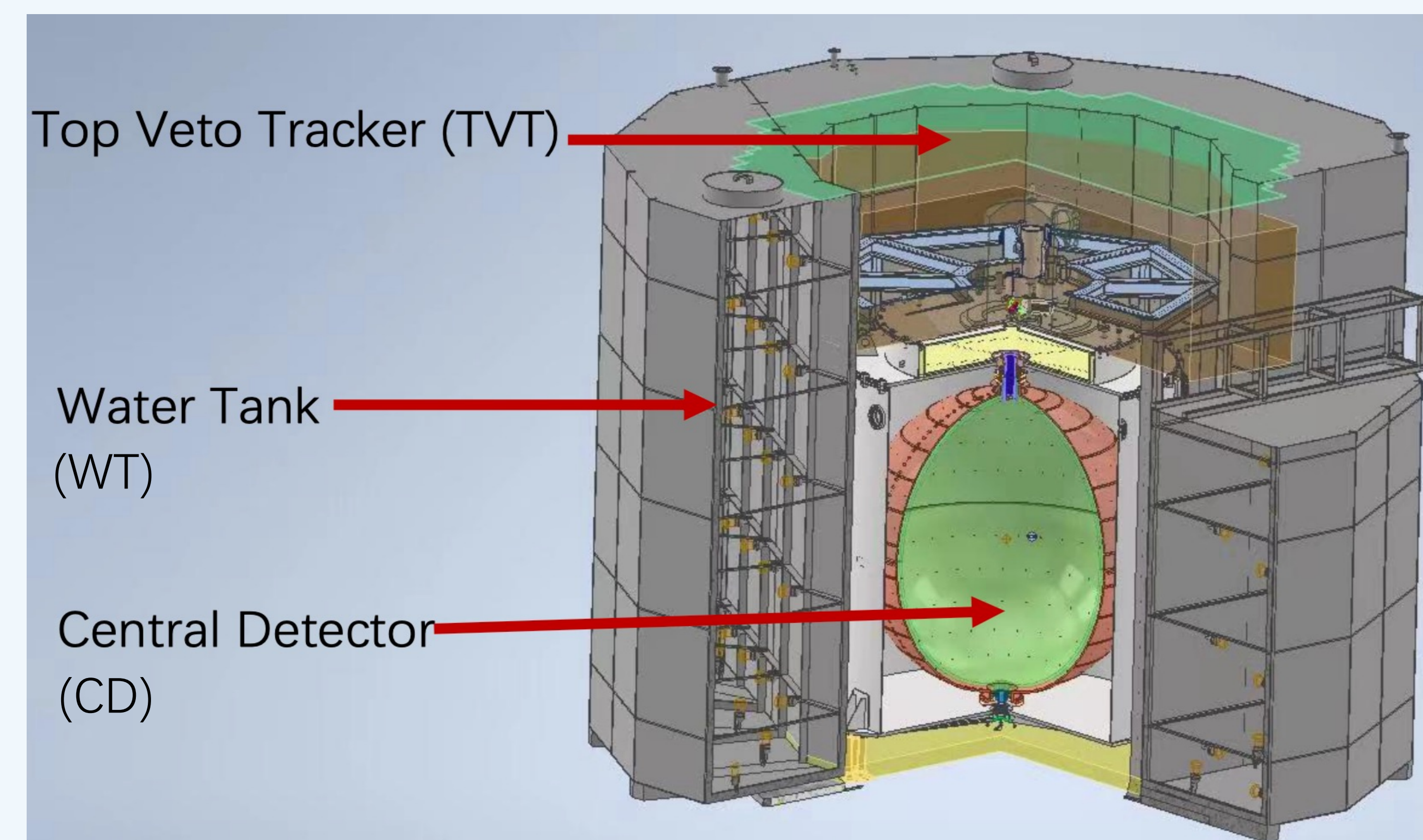


5. Muon Event Rates / Distributions



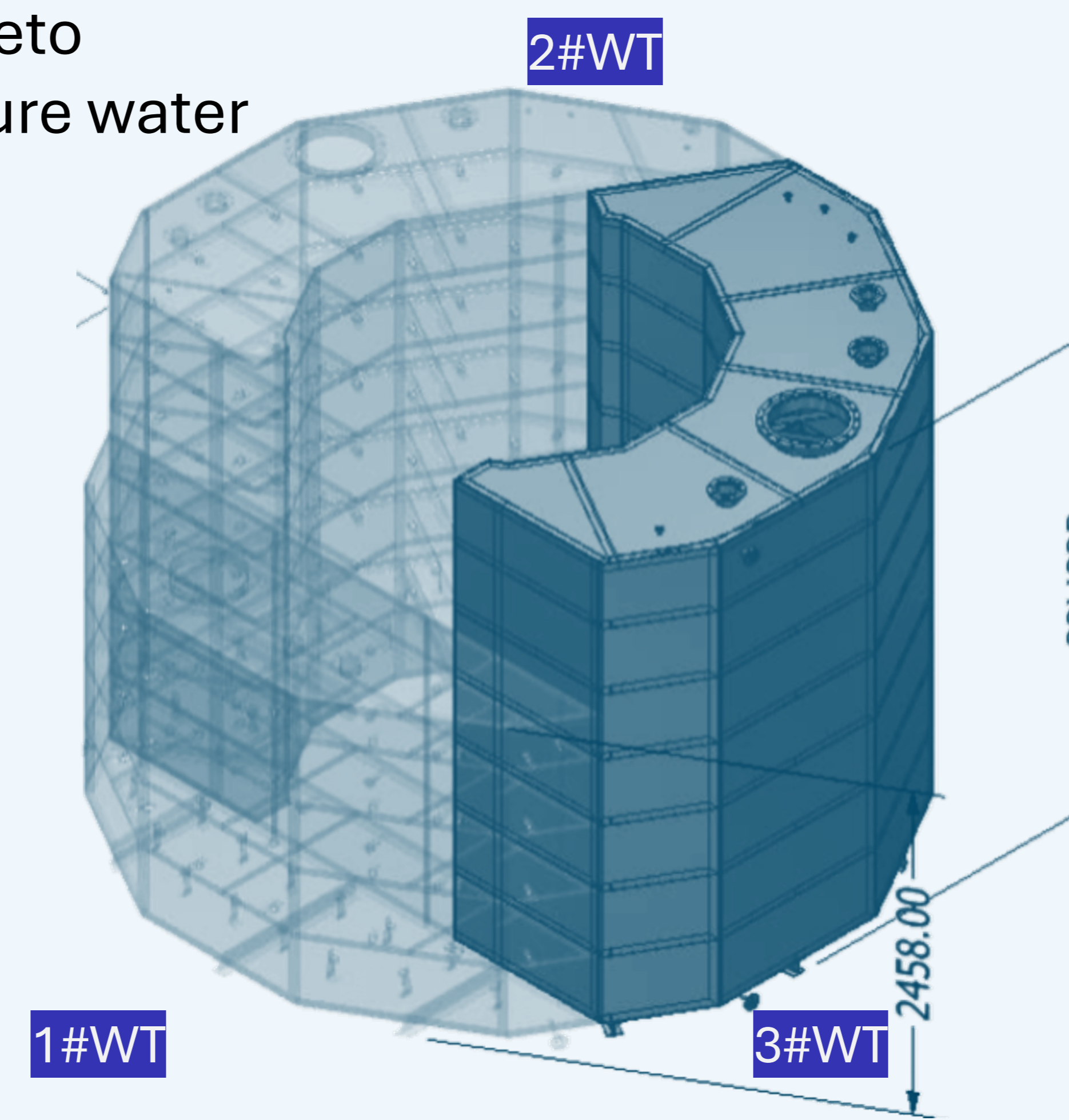
2. Detector Layout

- ▶ CD: 2.8 ton Gd-LS target for $\bar{\nu}_e$ detection
- ▶ WT: passive shielding + Cherenkov muon tagging
- ▶ TVT: top coverage plastic scintillator tracker



4. Water Tank (WT)

- Water Cherenkov Veto
- ▶ 46 tons ultra-pure water
 - ▶ 3 water tanks
 - ▶ Tyvek reflector
 - ▶ 300 PMTs



7. Muon veto efficiency

- Combined veto:
- ▶ TVT: layer coincidence (2/4)
 - ▶ WT: Cherenkov trigger
 - ▶ CD: E > 20 MeV cut

