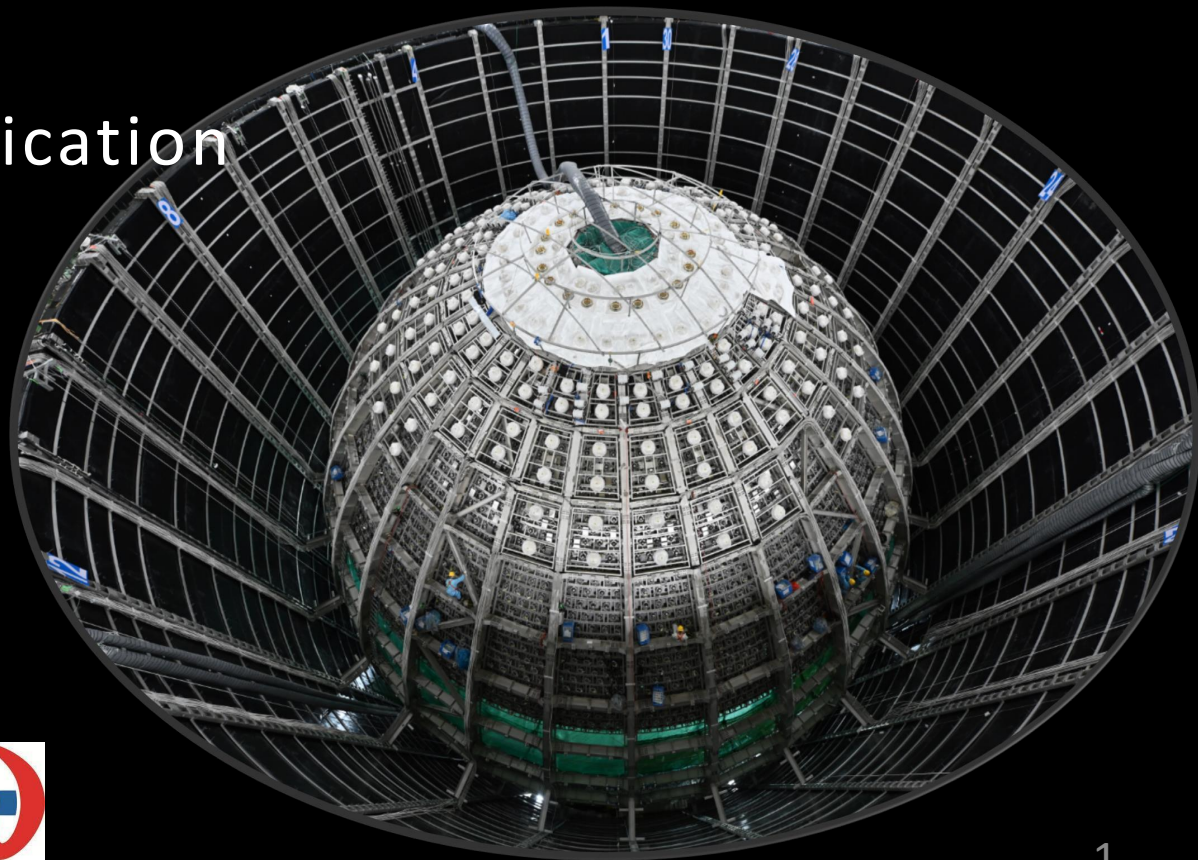


# JUNO Experiment:

## Electronics system Online event classification

Feng Gao  
MAYORANA School  
2023-07-06

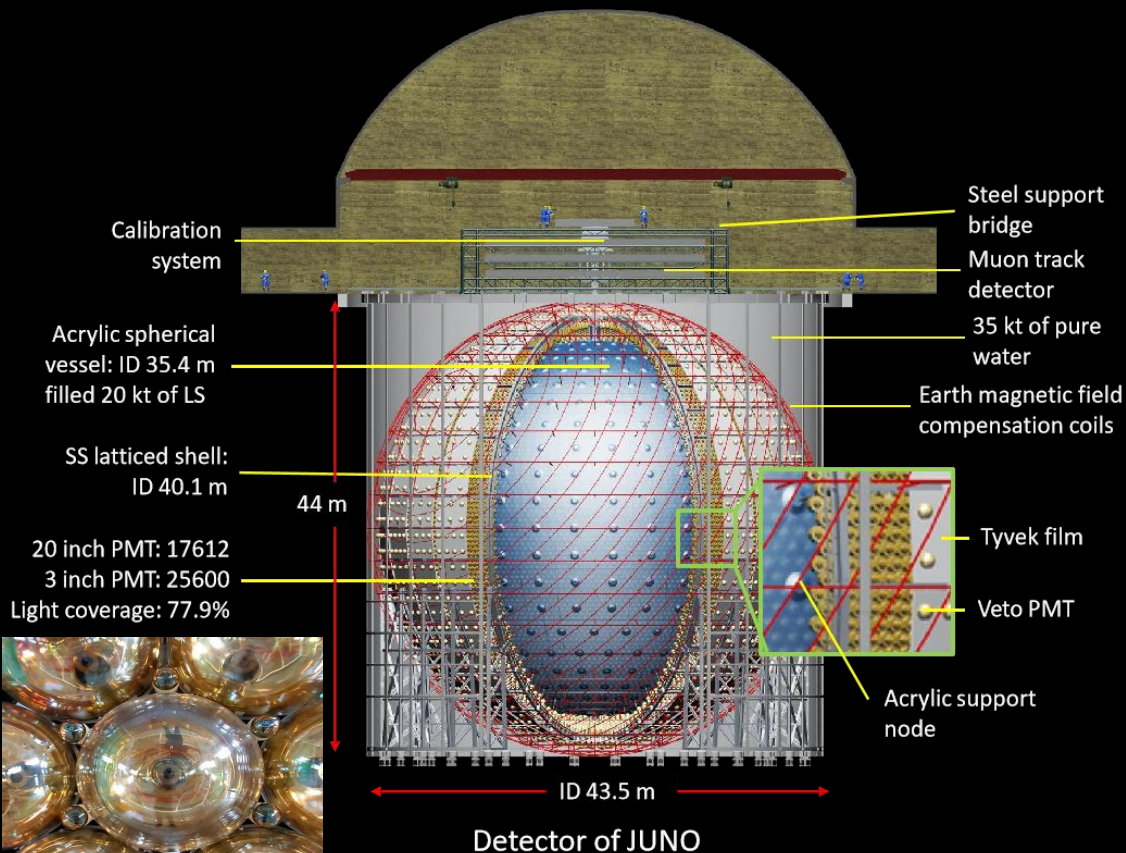


# Jiangmen Underground Neutrino Observation (JUNO)

- JUNO is a medium baseline (53 km) reactor neutrino experiment, the primary goal: determination of neutrino mass ordering.
- Located in Guangdong Province, South of China. It is located 650 m underground.

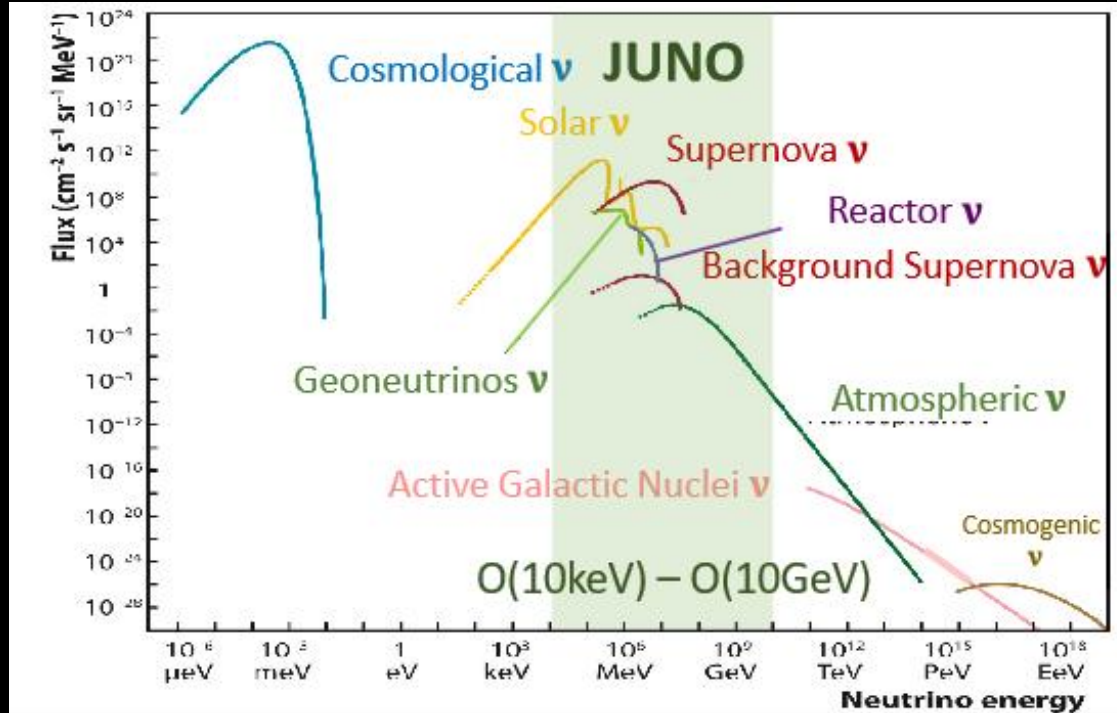


# JUNO experiment



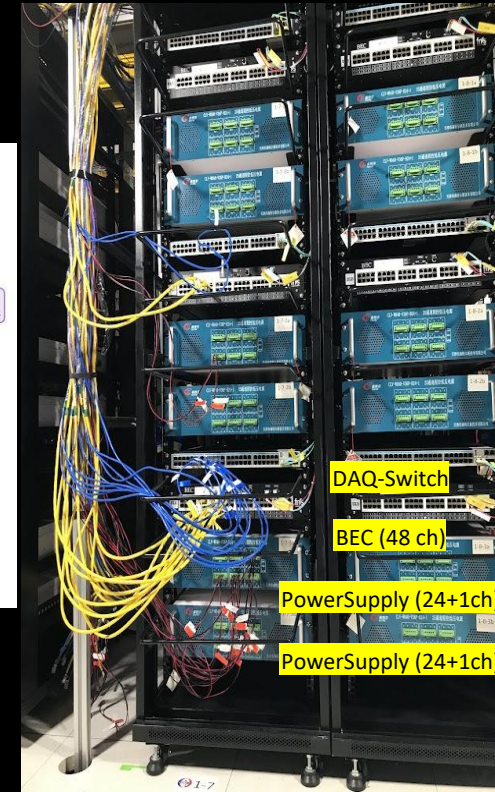
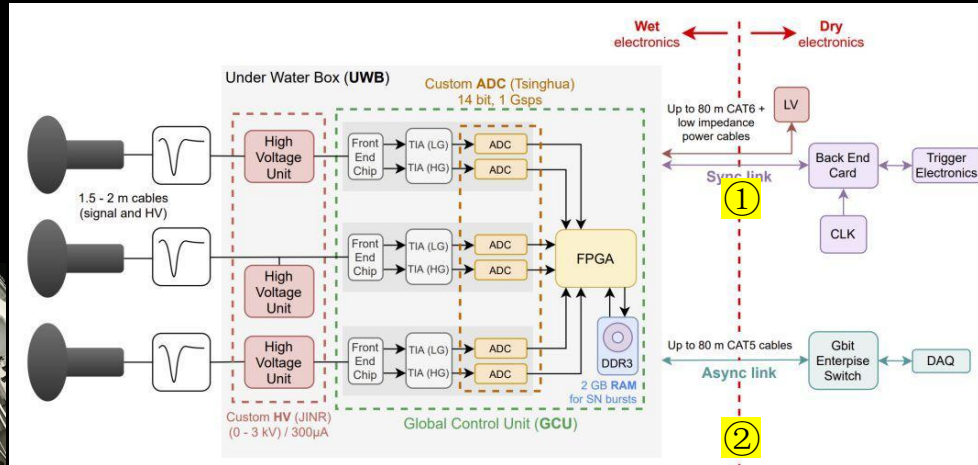
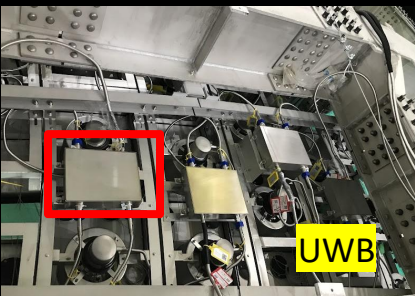
- A 20 kton liquid scintillator (LS) detector
- PMT coverage: 78%
- Energy resolution @ 1 MeV: 3%

# JUNO Physics Programme



Wide range of measurable neutrino energies + sources!

# Electronics system



more detail in my poster

# Online event classification(OEC)

## Constraints

Full waveforms from Front-End electronics to DAQ, ~40 GB/s

Data bandwidth via internet: 1 Gb/s  
(upgraded to 2.5 Gb/s)

→ Data storage: ~ 60 MB/s (100% contingency)

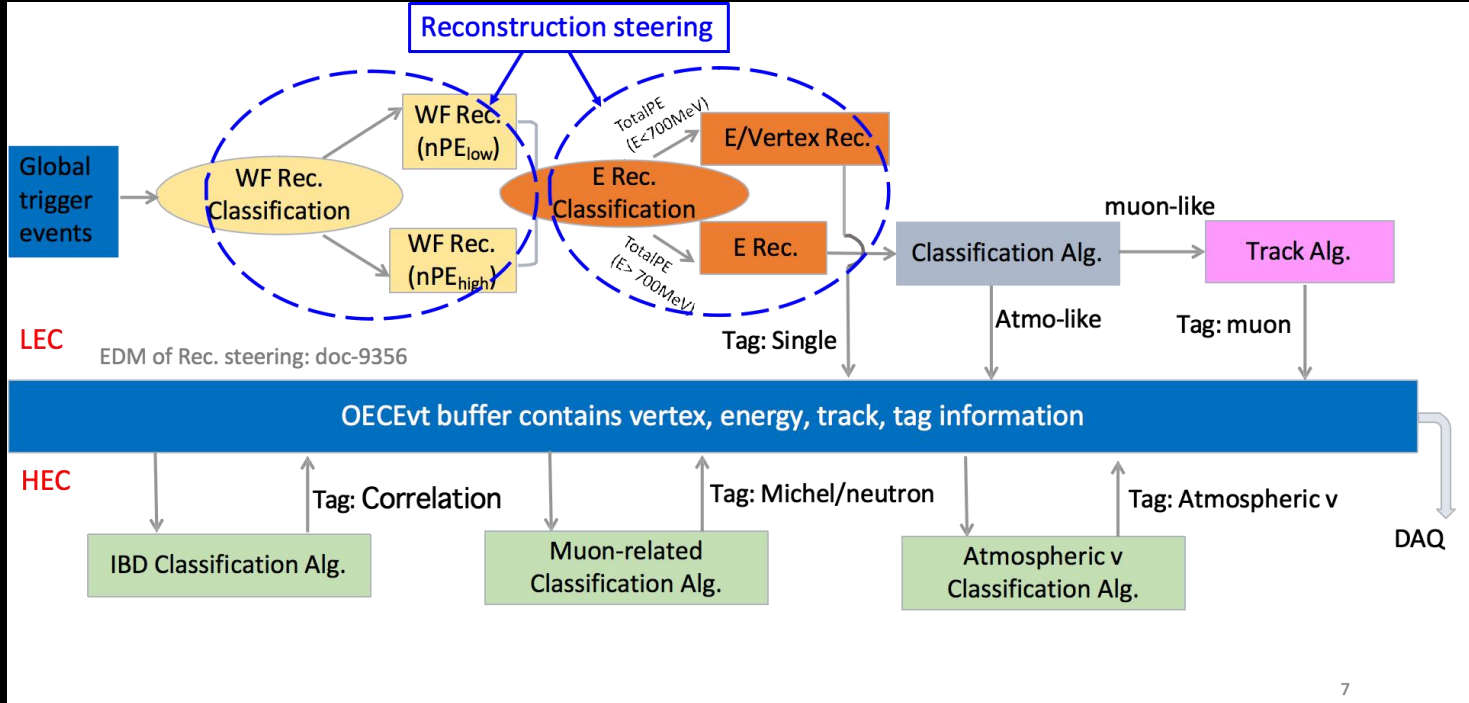
## Key functionalities

- OEC will be implemented on DAQ.
- Classify the readout triggers according to their physical characteristics
- Decide if a readout should keep raw waveform data

## Key principles

- NO readout is removed during OEC processing
- Saving T/Q pairs for all triggered events by default.
- Save necessary waveforms

# Online event classification(OEC)



LEC (Low level processing)

- Single Event Classification at distributed nodes, processing with fast reconstruction

HEC (High level processing)

- Correlated Event Classification at one node, output the final tags

# OEC tag atm neutrino (under discussion)

**Interest atm neutrino energy range:** 100MeV-10GeV

**Background:** Muon

**How to distinguish muon and atm neutrinos:**

- Muons will first trigger the water pool (WP) or top tracker (TT) -veto system
- Atm neutrinos will trigger center detector (CD) first

**Tag atm neutrino:**

- $E > 100\text{MeV}$
- No veto trigger within 5 $\mu\text{s}$  (primary result) before CD event



Thank you for your  
attention!

