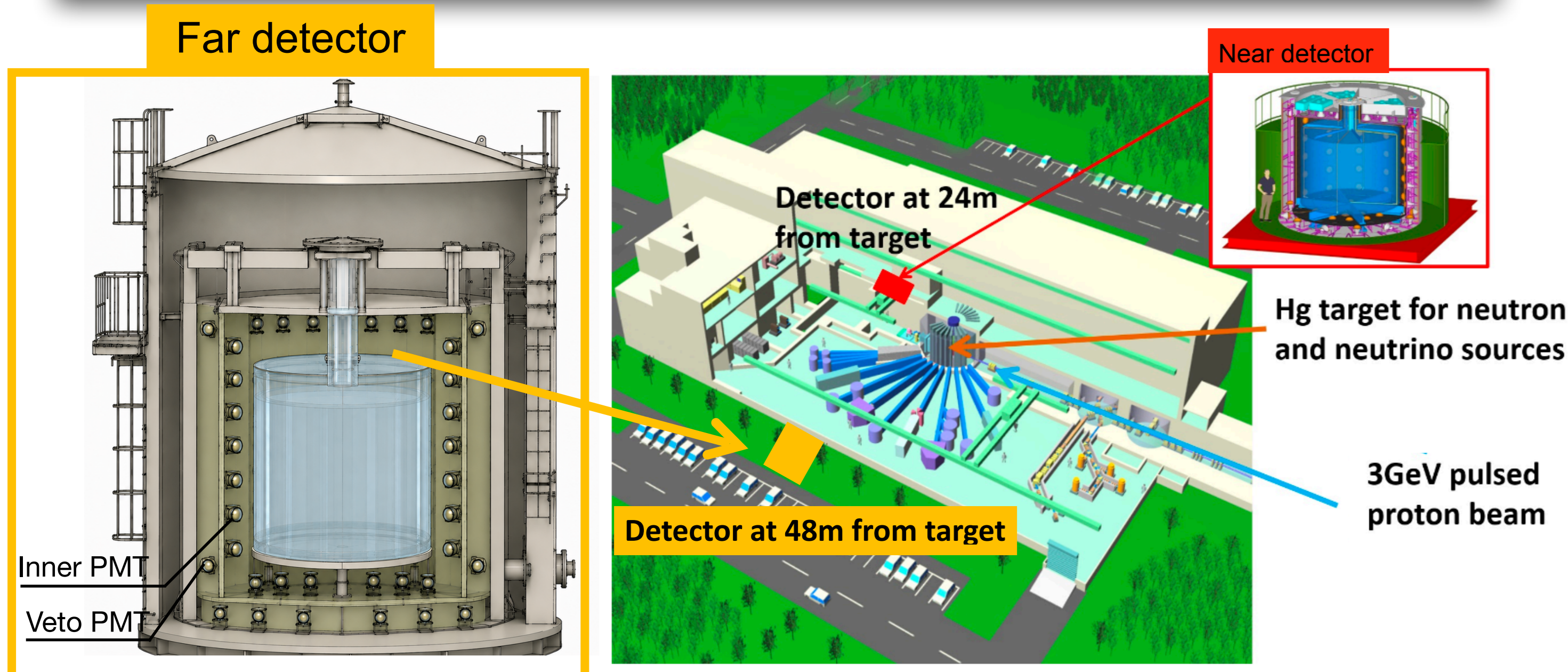
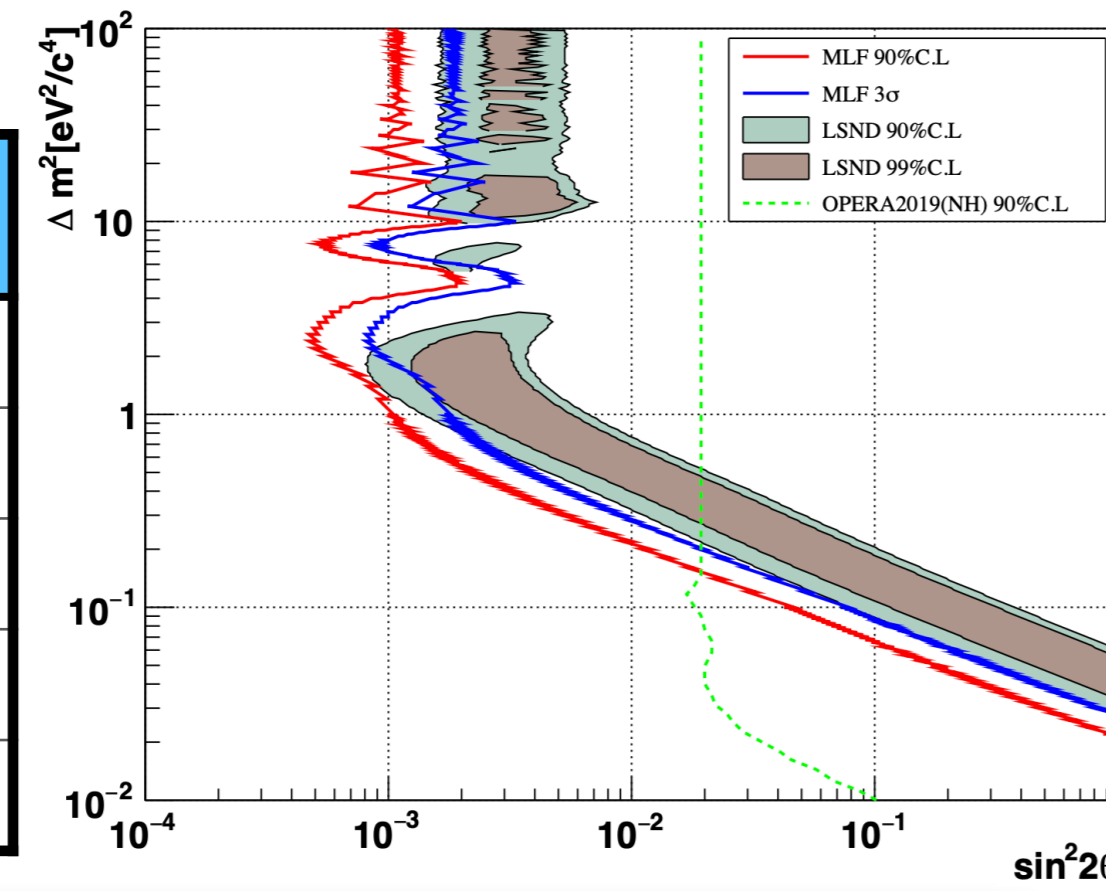


Introduction



- The second phase of the JSNS² experiment[1] (J-PARC Sterile Neutrino Search at J-PARC Spallation Neutron Source)
- Two detectors with two different baselines
- Solid conclusion on LSND anomaly
- Reduction of systematic uncertainties
- Enhanced understanding of beam correlated backgrounds
- Improved the sensitivity at low Δm^2 region

	Near	Far
Inner PMT	96	172
Veto PMT	24	48
Target	17 tons	32 tons
Catcher + veto	31 tons	131 tons
baseline	24 m	48 m



Overview

Monitoring System

- SCM : Slow Control Monitoring and System**
 - Monitors detector, LS, and environmental conditions using sensors
 - Sensors → NI modules → LabVIEW → MySQL → Web page
 - Provided real-time detector status during filling
 - Supports long-term detector stability monitoring
- HVCM : High Voltage Control and Monitoring system**
 - Communicates directly with the high-voltage power supply
 - Stores set and measured voltage / current values in a database
 - Visualizes voltage deviations and channel status in real time
 - Database information → other monitoring and analysis programs

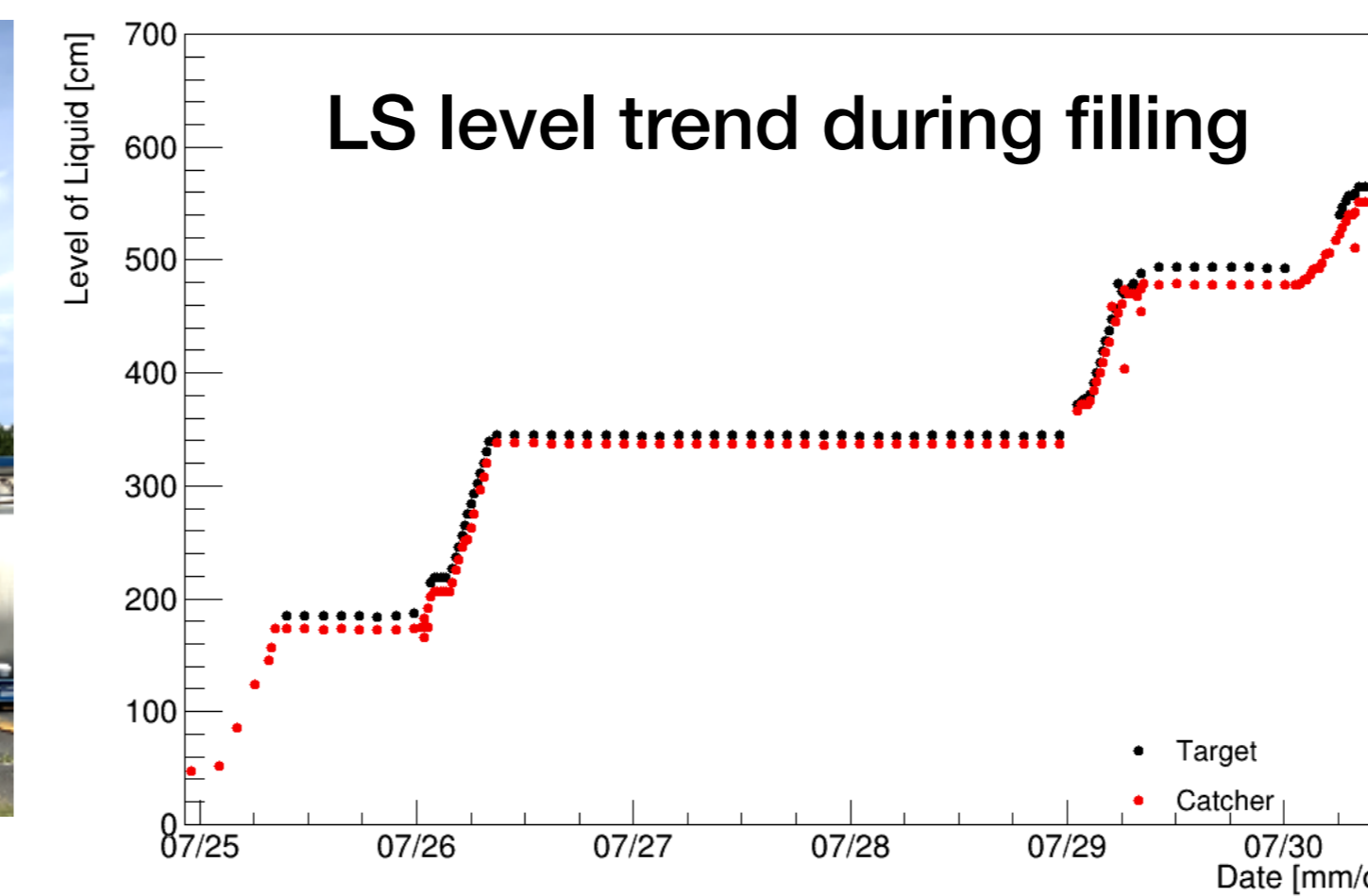
PMT Gain Measurements

- Periodic LED calibration runs are performed to monitor PMT gain stability
- PMT response is evaluated using charge distributions from LED data
- Long-term gain variations are tracked throughout detector commissioning

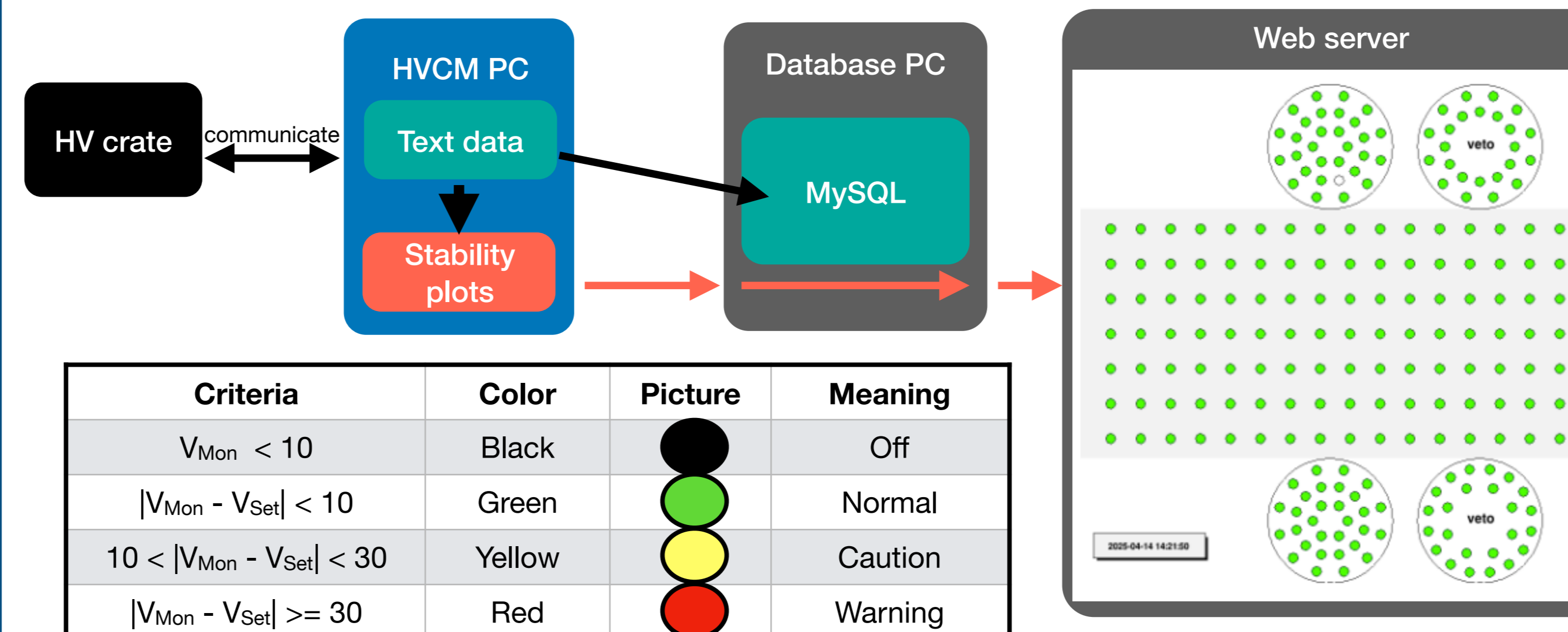
Monitoring system

Sensor type	Detection
Ultrasonic level sensor	Detection of LS leakage
	Level of Liquid scintillator
Oxygenmeter	Concentration of oxygen in the chimney
Pressuremeter	Differential pressure of inlet and outlet
Temperature	Temperature of LS
Ambient sensor	Temperature, Humidity, Atmosphere pressure in the roof space

- Linux-based LabVIEW**
- NI cDAQ-9178 Data Acquisition
- MySQL Database Storage
- Real-time Web Monitoring
- LS Filling & Long-term Detector Stability Monitoring



- 25 July – 6 August, 2024
- The target and the catcher + veto were filled simultaneously.
- 8 ISO tanks and 27 drums were successfully filled into the detector.



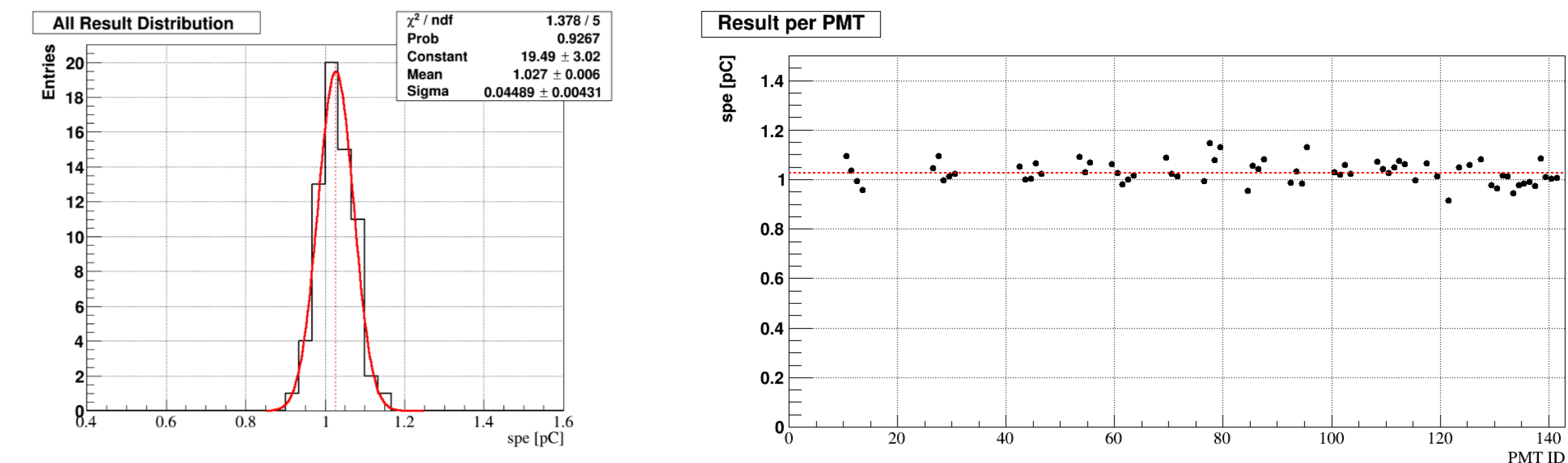
Criteria	Color	Picture	Meaning
$V_{Mon} < 10$	Black	●	Off
$ V_{Mon} - V_{Set} < 10$	Green	●	Normal
$10 < V_{Mon} - V_{Set} < 30$	Yellow	●	Caution
$ V_{Mon} - V_{Set} \geq 30$	Red	●	Warning

- Linux-based Standalone HVCM**
- Communicate with CAEN SY4527
- MySQL Database Storage
- ROOT-based Stability Monitoring
- Color-coded Warning System

PMT gain measurements



- Embedded LED system with UV and blue LEDs [2]
 - 12 blue LEDs (420 nm) → localized calibration
 - 2 UV LEDs (355 nm) → uniform illumination
- PMT and basic performance confirmed
 - Gains, HV curves, PV ratios, and relative T0 values
- Demonstrated feasibility of in-situ calibration



- The SPE charge distribution is well described by a Gaussian fit.
 - mean : 1.027 pC**
 - RMS : 0.0449 pC**
 - Gain : 6.41 x 10⁶** (for sufficient dynamic range)
 - The relative spread is about 4.5%
- Most channels cluster around the mean value, with no significant outliers.
- The requirement of the overall variation is within the $\pm 10\%$

Summary

- SCM, HVCN, and PMT stability monitoring were successfully established
- Their functionality and stability were verified during detector commissioning
- Continuous monitoring of detector conditions and PMT performance
- Systems have become integral to detector operation and physics data-taking

Reference

- [1] arXiv:2012.10807
- [2] 2025 JINST 20 T10003