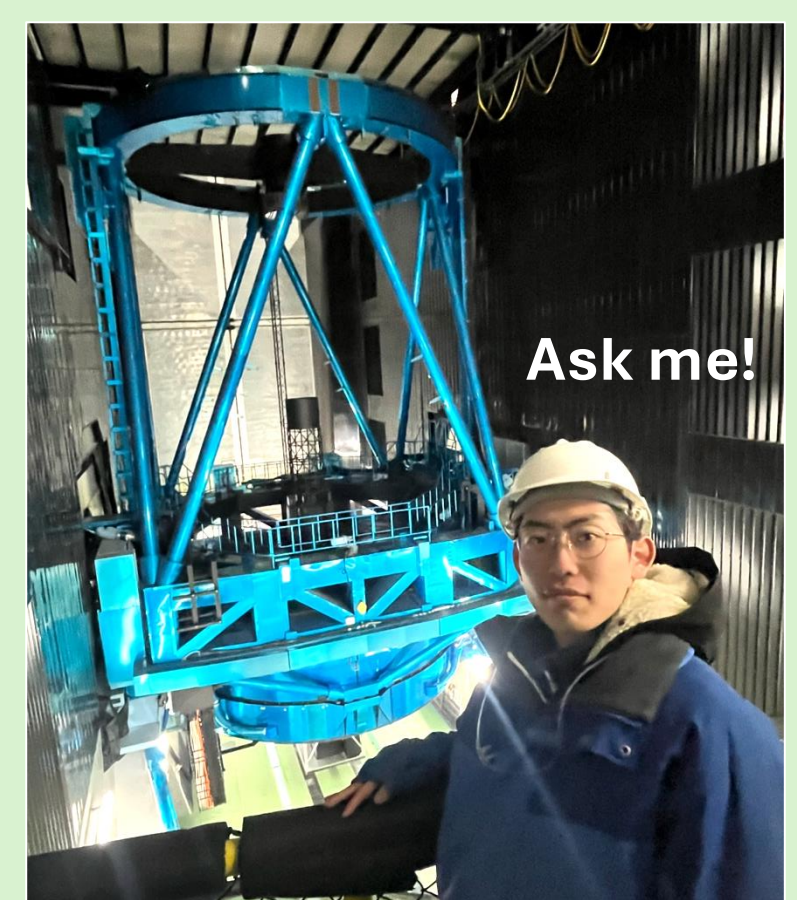




# Air-shower Lensing Observation at High Altitude (ALOHA) project : Current status and future prospects



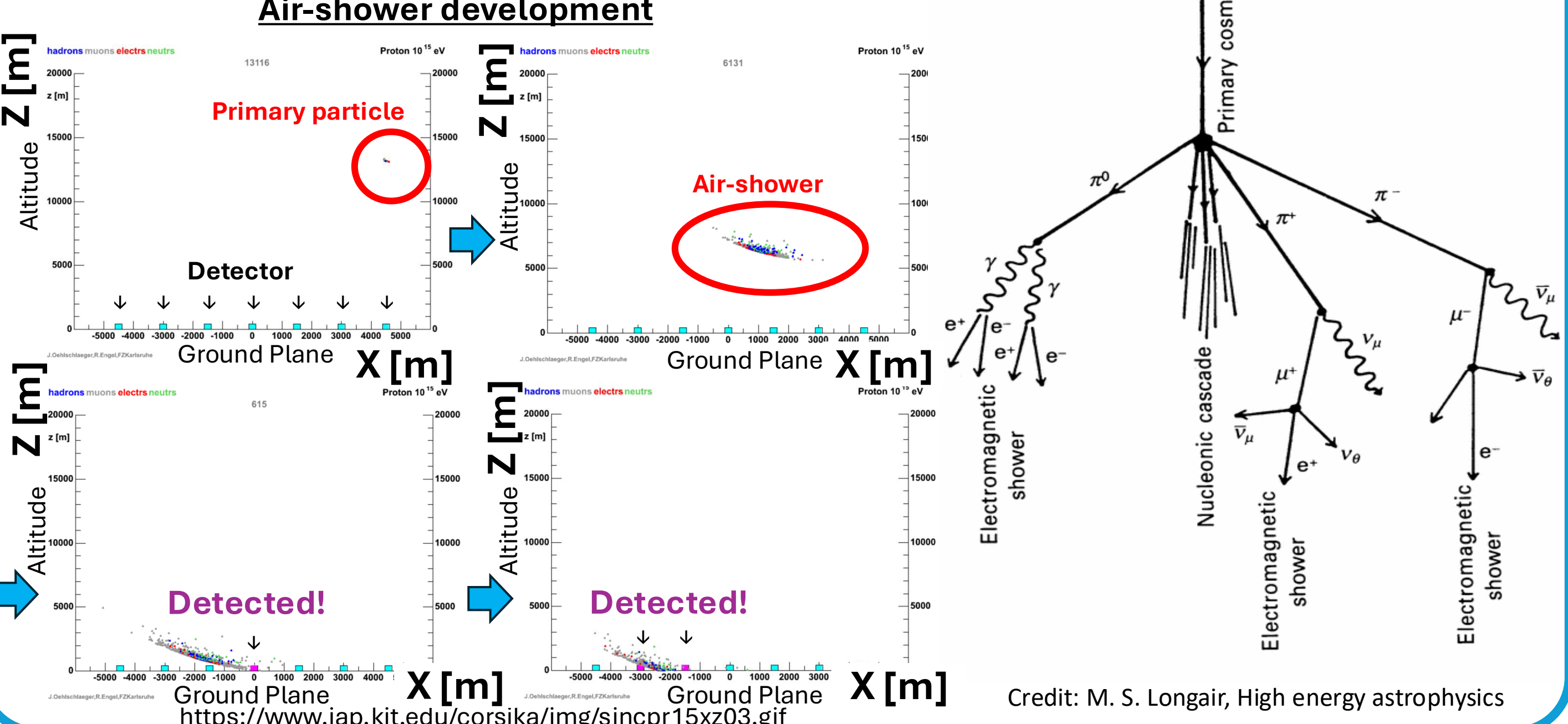
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## 1. Cosmic Ray

- High-energy particles traveling through space
- Composition: Proton (~90%), helium nuclei, etc.

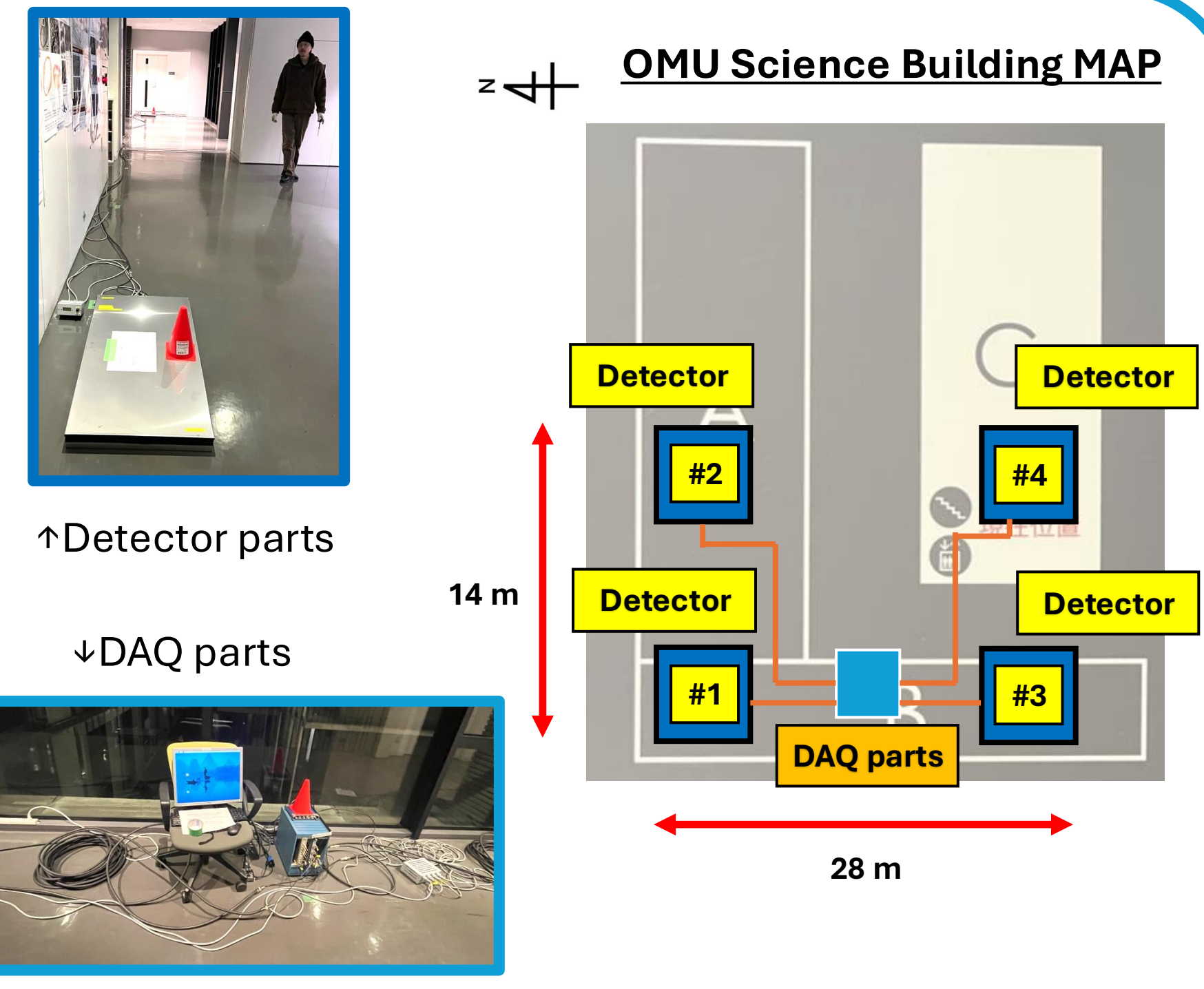
## Air-shower

A particle cascade in the atmosphere triggered by a high-energy cosmic ray

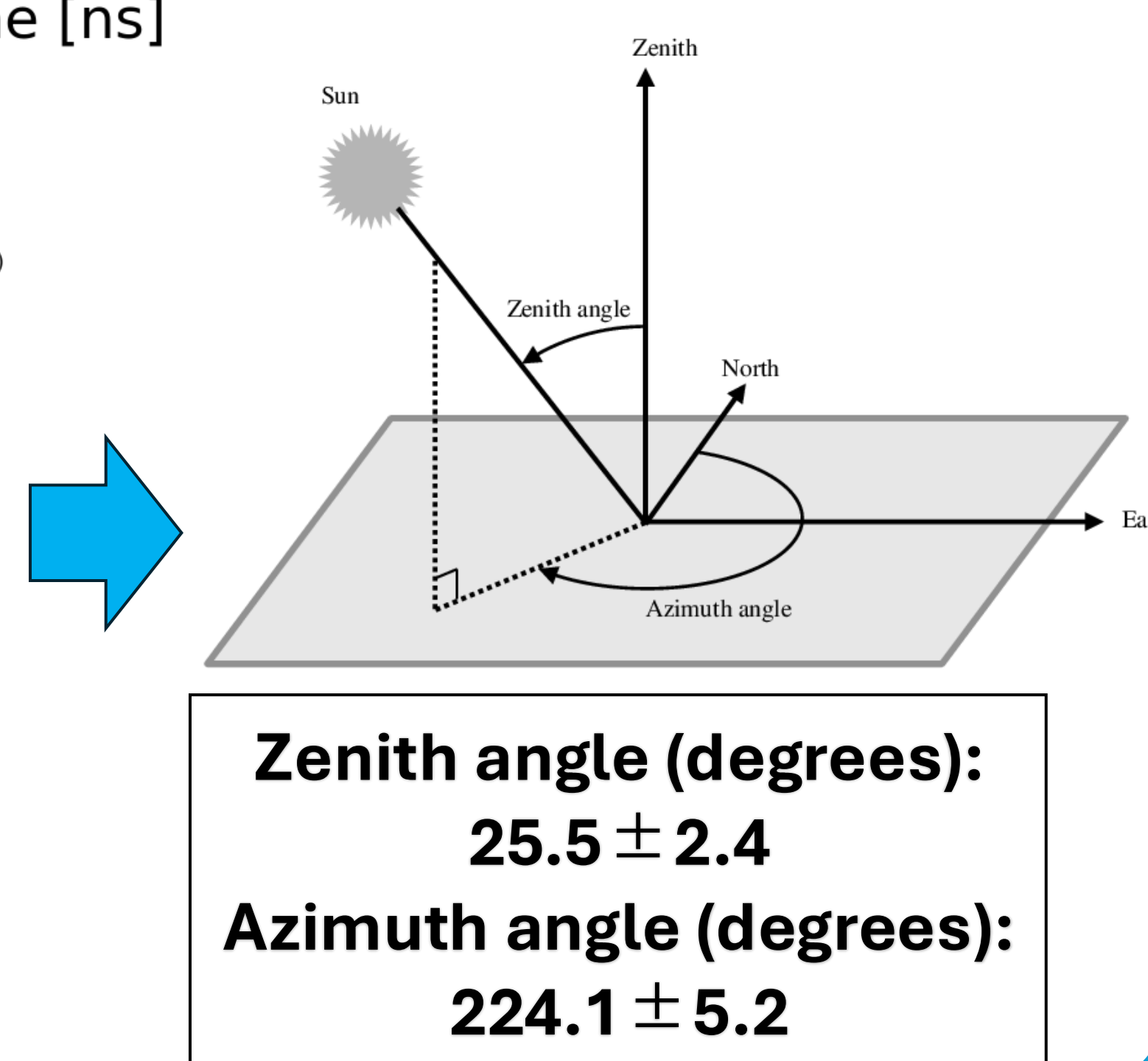
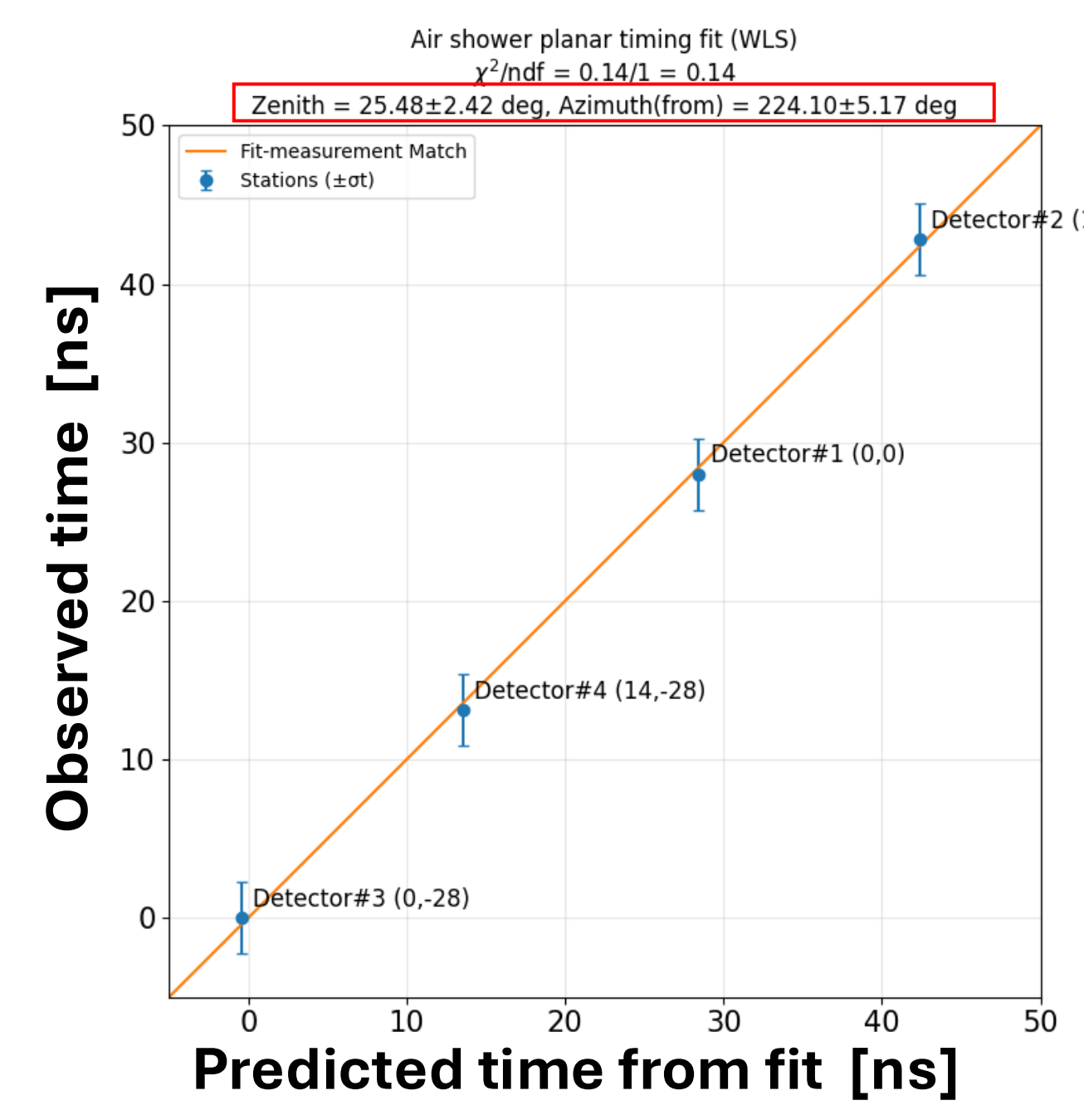
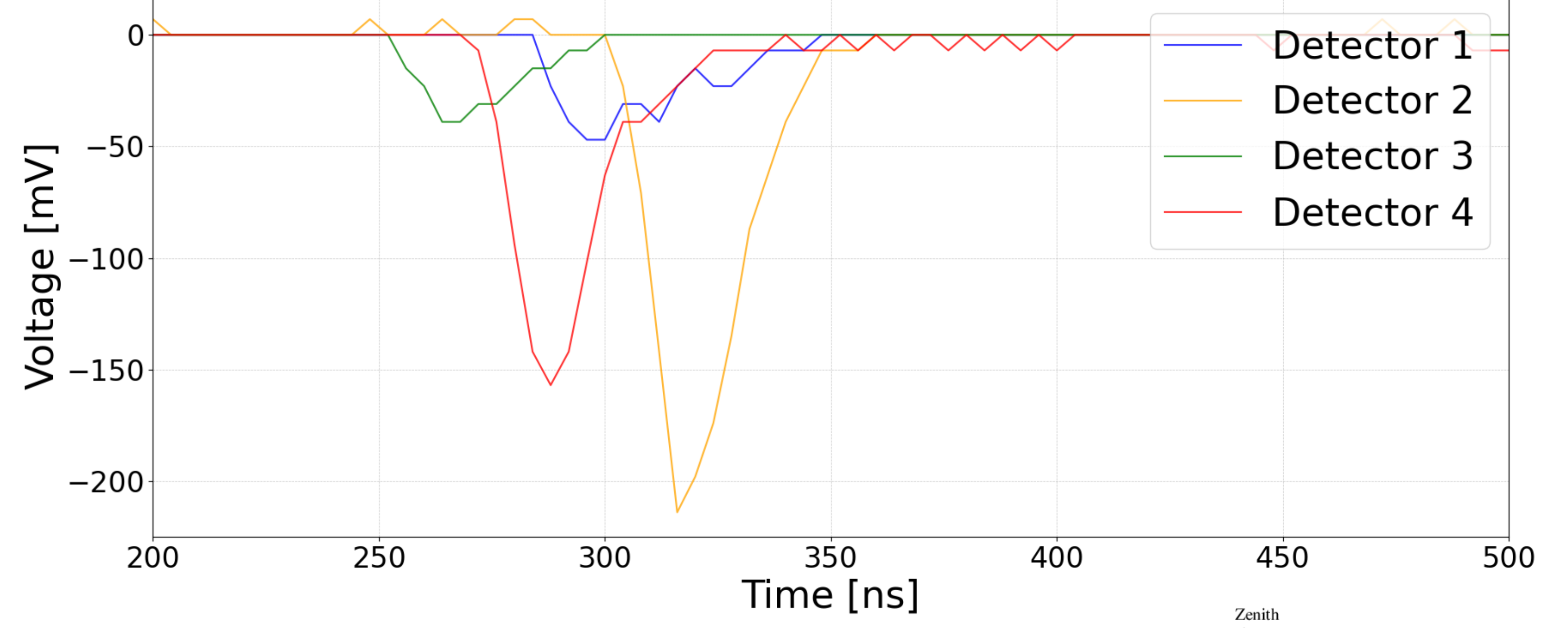


## 5. Surface detector's performance assessment

- 34-hour air-shower measurement at OMU
- 27 air-shower events observed
- Determining the arrival direction of air-shower

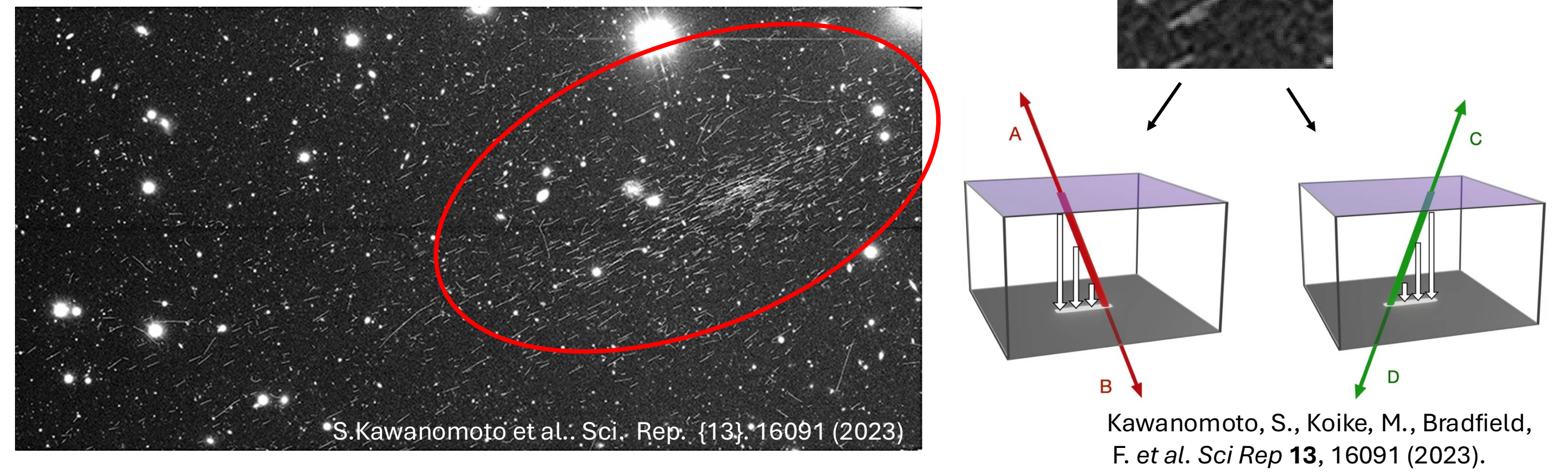


**Air-shower Events Waveforms**  
Trigger Time: 2026-01-25 03:07:14



## 2. ALOHA project

- Successful imaging of air-shower particle trajectories
- Potential to reveal the fine structure around the shower core



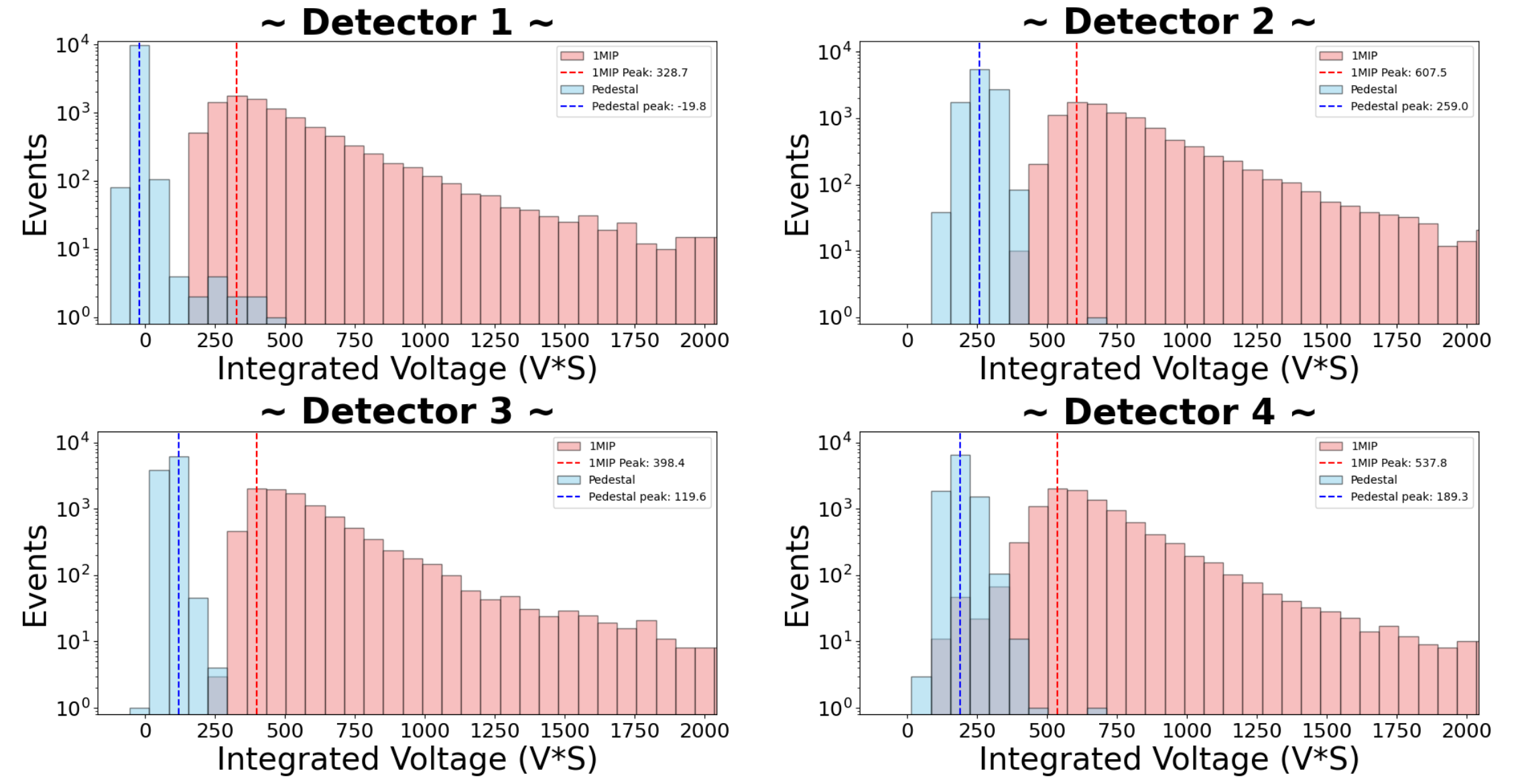
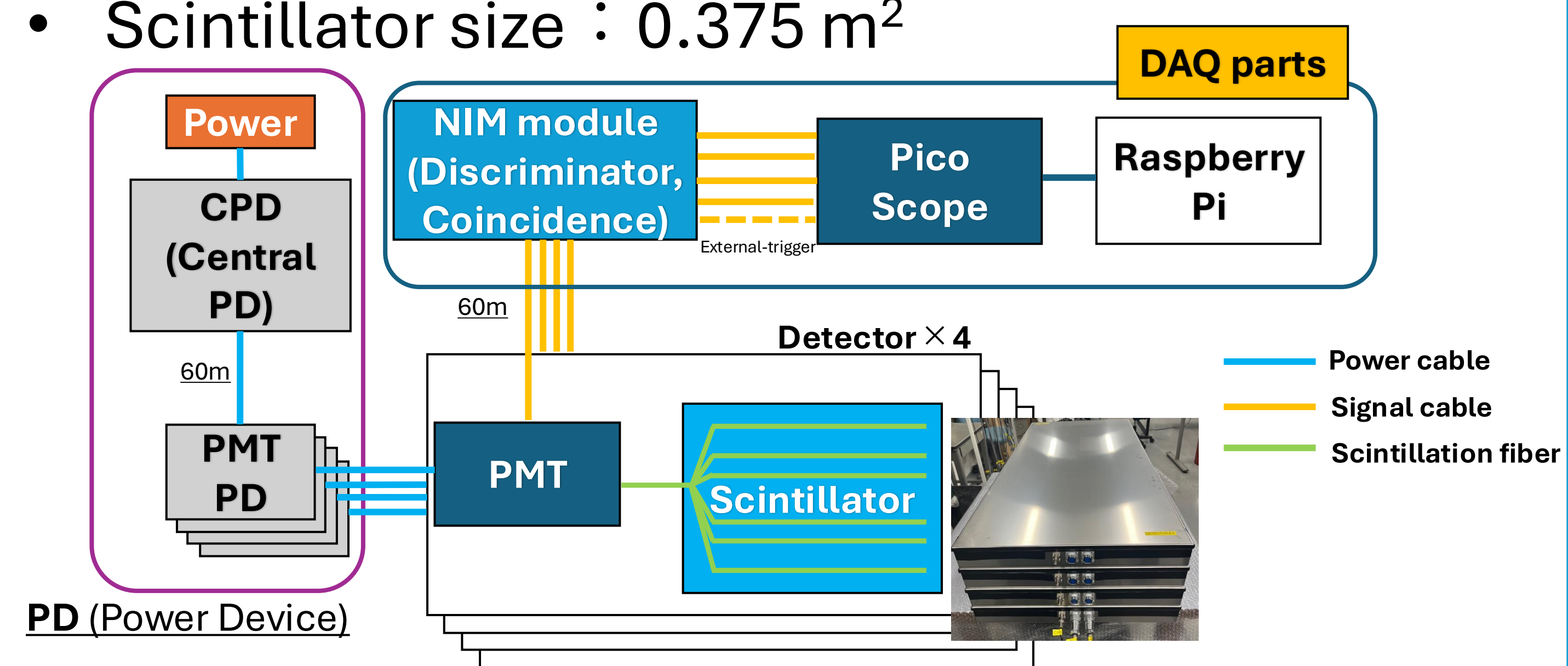
But... Four-way uncertainties in the arrival directions

Install the detectors and observe air-showers in combination with the Subaru HSC

## → ALOHA project

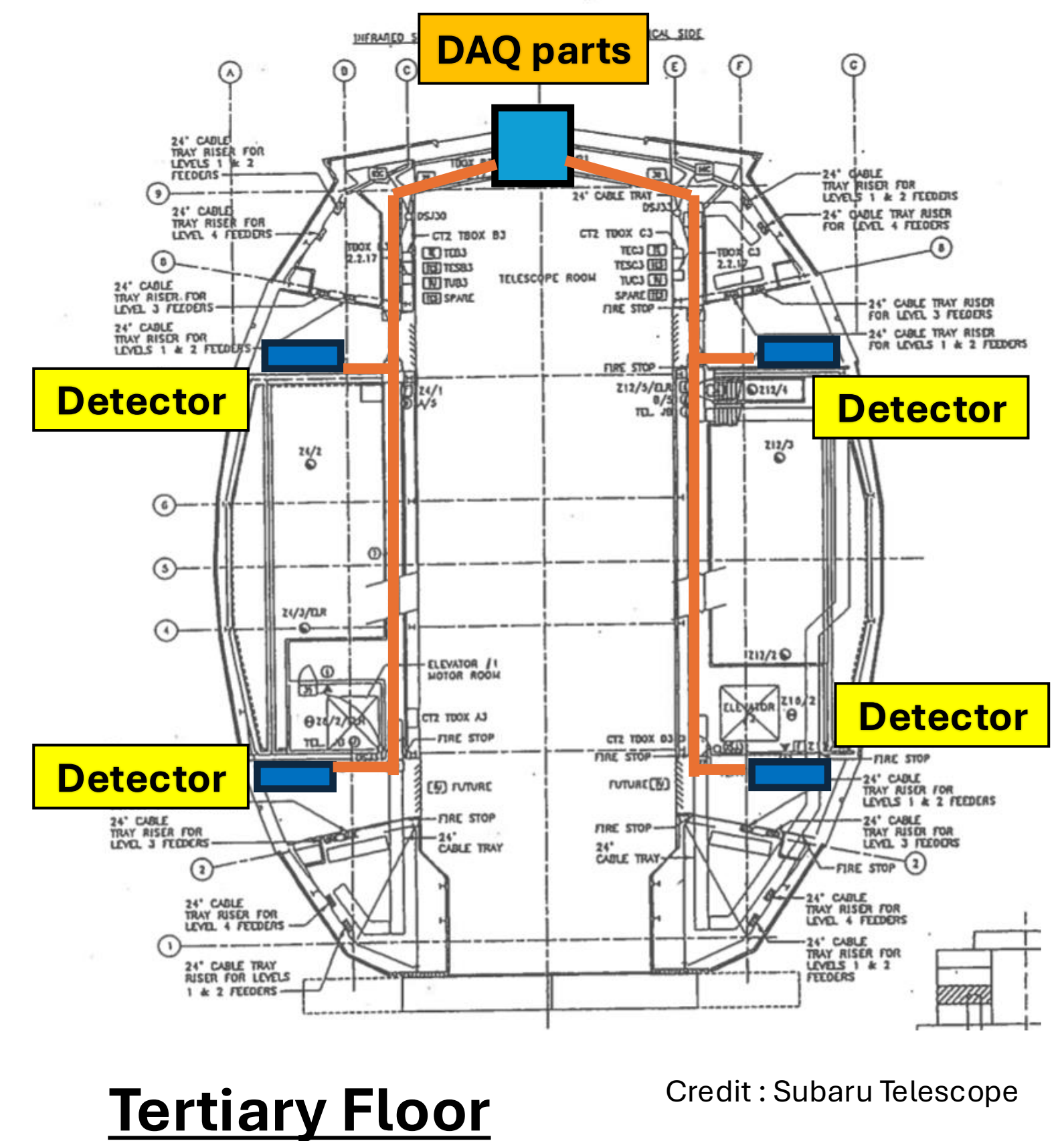
(Air-shower Lensing Observation at High Altitude)

## 3. Schematic of ALOHA system



## 5. Planned detector sites

- Visited the Subaru Telescope in March 2026
- Investigated the ALOHA system installation site



## 6. Future prospects

- Install the ALOHA system between July and August 2026
- Air-shower reconstruction incorporating Subaru HSC images
- Revealing the fine structure of air-shower cores through HSC image analysis