Working Group 6 (Detectors) Introduction

Yasuhiro NISHIMURA (Keio University)
on behalf of WG6 conveners
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16/Sep/2024, 25th NuFact 2024

Working Group 6 - Detectors -

- WG6 is dedicated to various technical aspects;
  - Technologies of detectors
  - Electronics and data acquisition
  - Techniques of analysis
  - Calibration, simulation, ..

WG6 Conveners

- Yasuhiro Nishimura

  Keio University in Japan

- Claudio Giganti

  LPNHE in France

- Tanaz Mohayai

  Indiana University Bloomington in US

Scope of WG6

- Detectors
- Electronics
- Calibration
- DAQ framework
- Data handling
- Simulation method
- Analysis techniques
  - Reconstruction
  - Systematics
  - Statistics

and so on

Hardware

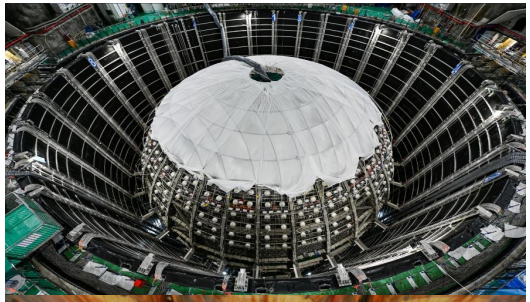
Software and computing

Common interest among experiments:
Intelligent trigger,
GPU computing,
Machine learning, etc.

What to do for future

Under construction

Upgrade, future experiments



New detection techniques, next detector design and R&D

Detector completion, calibration and reconstruction, more improvements

Key Questions

- What innovative detectors are realized for future experiments after several decades beyond the next programs?

- How high sensitivity with a large target volume and precise detection can be achieved at a reasonable cost?
- How much can we suppress detection systematics with future near detectors to improve neutrino measurements?

- How much improvement on calibration, simulation, and reconstruction is possible with less systematic uncertainties?
  - By machine learning, GPU, quantum computing, precise calibration instrumentations, etc.

- How can we efficiently cooperate on common techniques among different experimental groups?
  - Sharing electronics and DAQ, software and analysis framework, etc.

WG6 Program at NuFact2024

- 11:20 - 13:10 18/Sep Wed (Room A1100)
  - 6 talks
- 13:45 - 15:05 19/Sep Thu (Room E1200)
  - 4 talks
- 16:15 - 17:45 19/Sep Thu (Room E1200)
  - 5 talks
- 13:45 - 15:45 20/Sep Fri (Room E1200)
  - 6 talks

21 talks in 4 WG6 parallel sessions
20 minutes including discussion for each talk

7 posters to WG6 are presented today.

WG6 Posters

4. Precise Magnetic Field Mapping of the EMPHATIC Phase 1 Magnet with COMSOL Prachi Sharma

8. New method of neutrino and anti-neutrino detection from 0.2 to 100 MeV Nick Solomey

48. DAQ system and detector response for Super-FGD in the upgraded T2K near detector Jianrun Hu

64. Particle identification for proton and pion event discrimination using the SuperFGD prototype detector Diana Leon Silverio

101. UV light calibration system for the DUNE FD-HD Photon Detection System Jairo H. Rodriguez Rondon

115. Demonstrating MeV-Scale Physics Capabilities of Large Neutrino LArTPCs with Ambient Blip Activity in MicroBooNE Diego Andrade

167. PROSPECT-II Physics Goals and Detector Design Ohana Benevides Rodrigues

WG6: Wednesday, Sep 18, 2024

Parallel: WG6 (11:10 AM - 1:10 PM) **Chair : NISHIMURA, Yasuhiro (Keio University)**

Machine learning, particle tagging, detector response, etc.

11:10	**Machine Learning Reconstruction for DUNE's Near Detector Prototype: Handling Multi-Detector Input to Identify 3D Particle Signatures**	Dr MICALLEF, Jessie (Tufts University and MIT)
11:30	**Enforcing Self-Consistent Kinematic Constraints in Neutrino Energy Estimators**	BARROW, Joshua (UMN, FNAL visitor)
11:50	**Tagging Neutron Capture on Argon for Energy Calibration and MeV Physics**	SHI, Wei (Stony Brook University)
12:10	**Electromagnetic Response Studies in the NOvA Test Beam**	MYERS, Dalton (The University of Texas at Austin)
12:30	**Seasonal Variation in Cosmic Muon Rate at the NOvA Experiment**	PAL, Amit (National Institute of Scientific Education and Research (NISER))
12:50	**Measurements of MeV-Scale Radon Progeny in the MicroBooNE LArTPC**	FOREMAN, William (Illinois Institute of Technology)

WG6: Thursday, Sep 19, 2024

Calibration & reconstruction, highly granularity detector, electronics test

Parallel: WG6 (1:45 PM - 3:45 PM) **Chair : Lux, Thorsten (IFAE - BIST)**

1:45 **Detector calibration in the JUNO experiment**	TAKENAKA, Akira (Tsung-Dao Lee Institute, Shanghai Jiao Tong University)
2:05 **A new near neutrino detector SuperFGD for the T2K experiment**	DOYLE, Tristan (Stony Brook University)
2:25 **The ICEBERG Test Stand for DUNE Cold Electronics Development**	YANKELEVICH, Alejandro (University of California, Irvine)
2:45 **Energy reconstruction and calibration techniques of the DUNE LArTPC**	Mr KUMAR, Praveen (The University of Sheffield)

Parallel: WG6 (4:15 PM - 6:15 PM) **Chair : NISHIMURA, Yasuhiro (Keio University)**

LAr property, ND and FD

4:15 **Measurement of the mean excitation energy of liquid argon**	STRAIT, Matthew (Fermilab)
4:35 **The Near Detector Liquid Argon (ND-LAr) 2x2 prototype of DUNE**	KUMARAN, Sindhujha (University of California, Irvine)
4:55 **Design and status of the JUNO detector**	BERETTA, Marco (University of Milan - INFN)
5:15 **Technical challenges for the new T2K High Angle TPCs**	HASSANI, Samira (CEA-Saclay/DRF-IRFU, Univ. Paris – Saclay)
5:35 **Advances in Additive Manufacturing of 3D-Segmented Plastic Scintillator Detectors for Particle Tracking and Calorimetry**	KOSE, Umut

WG6: Friday, Sep 20, 2024

Updated after the introduction

Parallel: WG6 (1:45 PM - 3:45 PM) **Chair : NISHIMURA, Yasuhiro (Keio University)**

Optical fiber technology, photon-detection, high-resolutions

1:45 **ProtoDUNE Photon Detection System**	SOTO, José (IFIC)
2:05 **DUNE FD3 APEX Physics Prospects and Prototyping Status**	SHI, Wei (Stony Brook University)
2:25 **Signal and Power transmission over Fiber in the DUNE Far Detector**	SACERDOTI, Sabrina (APC)
2:45 **R&D of Power Over Fiber in harsh environments and its novel application for the DUNE FD-VD Photon Detection System**	LEON SILVERIO, Diana (South Dakota School of Mines and Technology)
3:05 **PLATON: An Unsegmented Active Target Particle Tracking Detector Concept**	DIEMINGER, Till (ETH Zurich)
3:25 **Fine-granularity 3D particle tracking with scintillating fibres (SciFi) readout with a single-photon avalanche diode (SPAD) array sensor**	FRANKS, Matthew (ETH Zürich)

Enjoy WG6 sessions

Please join and enjoy in WG6 detector sessions!

at Wed morning, Thu afternoon, and Friday afternoon