

## Introduction of Working Group 6 (Detectors)

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on behalf of WG6 conveners

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# Working Group 6 - Detectors -

- WG6 was launched in 2021.
- WG6 is dedicated to various technical aspects;
  - Technologies of detectors,
  - Electronics and data acquisition,
  - Techniques of analysis,
  - Calibration, simulation, ..
- 29 WG6 related presentations at NuFact2023
  - 3 plenary talks
  - 21 talks in parallel sessions
    - ▶ 13 talks in WG6, 8 talks in joint sessions with WG1 and WG4
  - 5 posters for WG6

# Scope of WG6

- Beamline → WG3: Accelerator Physics

- Detectors

- Electronics

- Calibration

- DAQ

- Data handling

- Simulation platform

- Analysis framework

  - Reconstruction

  - Systematics

  - Statistics

and so on

Hardware

Software and computing

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

# Scope of WG6

- Detectors

- Detector design and engineering (cavern, tank, vessel, etc.)
- Ar/Xe, Liquid/Gas, Single/Dual, pixelated readout, bubble
- Water Cherenkov detector, with Gd, water-base scintillator
- Scintillator and optical enhancement
  - ▶ Liquid, plastic segmentation, inorganic crystal, wavelength shifting, etc.
- Near detector components
  - ▶ Magnetized / non-magnetized active target
  - ▶ Movable detectors (PRISM, etc.)
- Detection technique
  - ▶ Photodetectors, gas detectors, tracking detectors, solid state detectors, ...

- Electronics

- Trigger, Readout, Power, FPGA, Synchronization, Communication, Durability, Evaluation, ...

# WG6 Program at NuFact2023

- 21/Aug Mon

- 16:00-18:05 : Plenary 2 at room#102

*3 WG6 Parallel sessions*  
*2 Joint Parallel sessions*

- 22/Aug Tue

- 14:00-16:00 : Parallel 1 WG6 at room#303
- 16:30-18:30 : Parallel 2 WG6 at room#303

- 23/Aug Wed

- 8:30-10:35 : Plenary 5 at room#102
- 13:00-15:30 : Poster

- 25/Aug Fri

- 9:00-10:30 : Parallel 3 WG4x6  
(Muon Physics x Detectors) at room#102
- 11:00-12:30 : Parallel 4 WG6 at room#302
- 14:00-16:00 : Parallel 5 WG1x6  
(Neutrino Oscillation Physics x Detectors) at room#101

# Plenary Talks on Detectors

20+5 min talks

- Plenary session on 21/Aug (Mon)

- 16:50-17:15 ARIGA, Tomoko (Kyushu University)  
**New results on LHC neutrinos from the FASER experiment**

*Forward Search Experiment at CERN for TeV neutrinos*

- Plenary session on 23/Aug (Wed)

- 9:45-10:10 DOYLE, Tristan (Stony Brook University)  
**Detection of neutrons in accelerator neutrino interactions**

*State of the art of neutron detection in accelerator neutrinos*

- 10:10-10:35 WILKING, Michael (Stony Brook University)  
**PRISM technique: challenges in infrastructure and analysis**

*Initiating detector moving system at both HK and DUNE*

# WG6 Detector Session on Tue

**Tuesday, 22 August 2023**

**14:00 – 15:20 Parallel 1 : WG6 at room#303 (Chair : Michael Joseph Wilking (Stony Brook University))**

14:00	[62] The DUNE Near Detector Suite	FURMANSKI, Andrew (University of Minnesota (US))
14:20	[159] The 2x2 Demonstrator: DUNE ND-LAr Prototype	MANDUJANO, Roberto
14:40	[80] ProtoDUNE-SP's performance, physics status, and future plans	OH, Sungbin (Fermilab (US))
15:00	[69] DUNE Vertical Drift LArTPC design	ZAMBELLI, Laura Amelie (Centre National de la Recherche Scientifique (FR))

***DUNE Technologies***

**16:30 – 18:10 Parallel 2 : WG6 at room#303 (Chair : NISHIMURA, Yasuhiro (Keio University))**

16:30	[29] Tests and assembly of the T2K near detector upgrade	NGUYEN, Dung Thi (Hanoi University of Science)
16:50	[156] Neutron detection with a 3D-projection scintillator tracker and its application to neutrino oscillation experiments	GWON, SunWoo
17:10	[119] 3-inch PMTs and electronics system in JUNO	CHU, Ziliang (The Institute of High Energy Physics of the Chinese Academy of Sciences)
17:30	[87] Multi-Calorimetry in Light-based Neutrino Detectors	HAN, Yang
17:50	[89] Performance and Testing of the JUNO 20-inch PMTs	STAHL, Achim (Rheinisch Westfaelische Tech. Hoch. (DE))

***T2K ND and JUNO large + small PMTs***

# WG6 Detector Session on Fri

**Friday, 25 August 2023**

**11:00 – 12:20 Parallel 4 : WG6 at room#302 (Chair : NISHIMURA, Yasuhiro (Keio University))**

11:00	[104] The Camera System for the IceCube Upgrade: Introduction to Its Purpose and Production.	Mr CHOI, Seowon (Sungkyunkwan University)
11:20	[138] WIT: from low energy to supernova neutrinos for Super-Kamiokande in the SK-Gd phase.	MARTI, Lluís
11:40	[140] A ton-scale single phase LAr CEvNS detector	JEONG, Haemin
12:00	[105] Signal Processing in SBND with WireCell	BHAT, Avinay (University of Chicago)

*Various topics of Camera, Trigger, LAr, Readout*



# Joint Sessions on Fri

**Friday, 25 August 2023**

**9:00 – 10:15 Parallel 3 : WG4(Muon) x 6(Detector) at room#102**

**(Chair : Khaw, Kim Siang (Tsung-Dao Lee Institute, Shanghai Jiao Tong University))**

09:00	[132] Status of the DeeMe experiment to search for the muon to electron conversion at J-PARC MLF	HIGASHINO, Yuta (Osaka Univ.)
09:25	[163] COMET Phase-Alpha Experiment to Investigate COMET's New Muon Beamline at J-PARC	WU, Chen (RCNP, Osaka University)
09:50	[68] Development of a muon entrance detector for the muEDM experiment at PSI	WONG, Guan Ming (TDLI (Shanghai Jiao Tong University))

**14:00 – 15:40 Parallel 5 : WG1(Neutrino Oscillations) x 6(Detector) at room#101**

**(Chair : Miao He hem (IHEP))**

14:00	[52] Deep Learning applications to the event reconstruction in JUNO	LUO, Wuming (Institute of High Energy Physics, Chinese Academy of Science)
14:20	[99] Deep Learning Reconstruction at DUNE Far Detector	Prof. BIAN, Jianming (University of California Irvine (US))
14:40	[72] Classification of muon- and electron neutrino events for the ESSnuSB Near Detector using Graph Neural Networks	IVERSEN, Kaare Endrup (Lund University (SE))
15:00	[128] Prospects for physics with the T2K ND280 Upgrade	MUNTEANU, Laura (CERN)
15:20	[175] Simulation and reconstruction of neutrino interactions in the upgraded T2K ND280 detector	LACHNER, Katharina (University of Warwick)

# WG6 Poster Presentations

- At poster session 13:00 - 15:30 23/Aug (Wed)
  - **Fluor wavelength classification of liquid scintillator using images acquired by CMOS image sensor and deep convolutional neural network (CHOI, Ji-Young)**
  - **The spectrum analysis of light emitted by LED using a CMOS RGB-based image sensor and feasibility study for its application (PARK, Hyeon Woo)**
  - **The Camera System for the IceCube Upgrade: Simulation Studies of the Antarctic Ice Properties (Jiwoong Lee)**
  - **Discrimination of Fluor Concentration in Liquid Scintillator Using PMT Waveform and Short-Pass Filter (KIM, Nari)**
  - **Development of water-based liquid scintillator tracker for a precise measurement of neutrino-water interactions (ONDA, Naoto)**

# Enjoy WG6 sessions

- Third WG6 workshop in NuFact series
  - Please enjoy various technical topics
- Synergy with other WGs for technical discussion
  - Joint sessions  
with WG1 (Neutrino oscillation), WG4 (Muon)
- Please join and enjoy in WG6 detector sessions!

