

**3rd Open Meeting for the
Hyper-Kamiokande Project**

Report of Contributions

Contribution ID: 0

Type: **not specified**

Goals of Meeting

Friday, 21 June 2013 09:00 (25 minutes)

I will briefly explain discussion items of the meeting.

Primary author: Prof. SHIOZAWA, Masato (The University of Tokyo, Institute for Cosmic Ray Research, ICRR)

Presenter: Prof. SHIOZAWA, Masato (The University of Tokyo, Institute for Cosmic Ray Research, ICRR)

Session Classification: Opening Session

Contribution ID: 1

Type: **not specified**

Facility to measure PMT properties

Saturday, 22 June 2013 15:30 (15 minutes)

A facility to measure the response and reflective properties of PMTs (and other materials) in water is under construction at TRIUMF. Through two manipulator arms, collimated and polarize laser light at various wavelengths can be directed at the PMT (or other sample) from a large range of position and angles, with reflected light detected by a photosensor on the other arm. The facility includes Helmholtz compensation coils and shielding to reduce ambient magnetic fields and a vessel to allow measurements in water.

Primary author: Mr TANAKA, Hirohisa A. (University of British Columbia/Institute of Particle Physics)

Presenter: Mr TANAKA, Hirohisa A. (University of British Columbia/Institute of Particle Physics)

Session Classification: Detector Calibrations

Contribution ID: 2

Type: **not specified**

HK Internal/Domestic situation (HKWG steering group report)

Friday, 21 June 2013 09:25 (15 minutes)

HKWG steering group report

Primary author: Prof. NAKAYA, Tsuyoshi (Kyoto)

Presenter: Prof. NAKAYA, Tsuyoshi (Kyoto)

Session Classification: Opening Session

Contribution ID: 3

Type: **not specified**

A New Proposal for a Tokai to Hyper-K Near Detector

Friday, 21 June 2013 13:20 (20 minutes)

In order to maximize the physics potential of a projected 10 year beam running period, systematic uncertainties at the 2% level are required, and the largest source of systematic uncertainty is projected to be from uncertainties on neutrino interaction cross sections. This new near detector proposal aims to significantly reduce the dependence of T2HK measurements on a priori knowledge of neutrino cross sections by utilizing a variety of off-axis angles to empirically determine the relationship between neutrino energy and lepton kinematics.

Primary author: Dr WILKING, Michael (TRIUMF)

Co-author: Dr HARTZ, Mark (IPMU)

Presenter: Dr WILKING, Michael (TRIUMF)

Session Classification: Physics Potential

Contribution ID: 4

Type: **not specified**

Overview of the photodetector development

Saturday, 22 June 2013 09:00 (10 minutes)

I will present a brief introduction of current activities in the photodetector sub-WG and the plan for the photodetector development.

Primary author: Dr NAKAYAMA, Shoei (Kamioka Observatory, ICRR, The University of Tokyo)

Co-author: Dr NISHIMURA, Yasuhiro (Research Center for Cosmic Neutrinos, ICRR, The University of Tokyo)

Presenter: Dr NAKAYAMA, Shoei (Kamioka Observatory, ICRR, The University of Tokyo)

Session Classification: Photo-detectors

Contribution ID: 5

Type: **not specified**

HK sensitivity with T2K systematic treatment

Friday, 21 June 2013 10:40 (20 minutes)

The sensitivity of CP measurement using J-PARC beam shown in Hyper-K LOI is calculated with fixed θ_{23} and δm^2_{32} , and the treatment of systematic uncertainty is very simple. To validate the LOI sensitivity, I will show the sensitivity obtained by fitting 4 oscillation parameters (δ_{CP} , θ_{13} , θ_{23} , and δm^2_{32}) with more realistic treatment of the systematic uncertainty based on the actual estimation for T2K. In addition, the effect of the constrained on θ_{13} from reactor experiments will be shown.

Primary author: Dr IKEDA, Motoyasu (Kyoto University)

Co-author: Dr MEGAN, Friend (KEK)

Presenter: Dr IKEDA, Motoyasu (Kyoto University)

Session Classification: Physics Potential

Contribution ID: 6

Type: **not specified**

Hyper-K site and cavern

Friday, 21 June 2013 15:35 (20 minutes)

I will summarize the cavern design studies and plan of geological survey at Mozumi site. Document plan will be also explained.

Primary author: Prof. SHIOZAWA, Masato (The University of Tokyo, Institute for Cosmic Ray Research, ICRR)

Presenter: Prof. SHIOZAWA, Masato (The University of Tokyo, Institute for Cosmic Ray Research, ICRR)

Session Classification: Cavities and Tanks

Contribution ID: 7

Type: **not specified**

Systematic uncertainties in long-baseline neutrino oscillation experiments

Friday, 21 June 2013 11:00 (20 minutes)

The CP violating effect in the $\nu_\mu \rightarrow \nu_e$ oscillation probability is suppressed with respect to the CP-conserving contribution. Therefore, systematic uncertainties affecting the signal at long baseline oscillation experiments are extremely relevant for the CP violation searches. We will present a phenomenological analysis showing the possible impact that systematic errors may have on long baseline experiments such as T2HK, and comment on which of these uncertainties are expected to have the greatest effect.

Primary author: Dr COLOMA, Pilar (VirginiaTech)

Co-author: Dr MANECKI, Szymon (VirginiaTech)

Presenter: Dr MANECKI, Szymon (VirginiaTech)

Session Classification: Physics Potential

Contribution ID: 8

Type: **not specified**

Using Fast Photosensors in the Next Generation Water Cherenkov Neutrino Detectors

Saturday, 22 June 2013 10:45 (20 minutes)

The next generation of neutrino experiments will require massive and high resolution detectors to reach the sensitivity needed to measure CP violation in the lepton sector and the neutrino mass hierarchy.

New photodetectors based on micro-channel plates are being developed by the Large-Area Picosecond Photo Detector (LAPPD) Collaboration. These photosensors have shown potential for excellent spatial and timing resolution. The application of these developments in photodetector technology to large water Cherenkov detectors could enhance background rejection and vertex resolution by using the gains in spatial and timing information.

We describe briefly the status of the LAPPD development and show preliminary results on the reconstruction capabilities for single particles in a 200-kton size water Cherenkov detector.

Primary author: Prof. SANCHEZ, Mayly (Iowa State University)

Presenter: Prof. SANCHEZ, Mayly (Iowa State University)

Session Classification: Photo-detectors

Contribution ID: 9

Type: **not specified**

new calibration source R&D

Saturday, 22 June 2013 16:00 (15 minutes)

The status of the development of new calibration source R&D for Hyper-K.

Primary author: Dr KOSHIO, Yusuke (Okayama university)

Presenter: Dr KOSHIO, Yusuke (Okayama university)

Session Classification: Detector Calibrations

Contribution ID: **10**

Type: **not specified**

Overview and plan for Hyper-K calibration

Saturday, 22 June 2013 15:00 (15 minutes)

I will discuss overview of current status and prototyping / R&D plans for Hyper-K calibration.

Primary author: Dr TANAKA, Hide-Kazu (ICRR, University of Tokyo)

Presenter: Dr TANAKA, Hide-Kazu (ICRR, University of Tokyo)

Session Classification: Detector Calibrations

Contribution ID: 11

Type: **not specified**

Hyper-K tank and photo-sensor support structure

Friday, 21 June 2013 15:55 (15 minutes)

I will discuss the current status and updates on Hyper-K tank design.

Primary author: Dr TANAKA, Hide-Kazu (ICRR, University of Tokyo)

Presenter: Dr TANAKA, Hide-Kazu (ICRR, University of Tokyo)

Session Classification: Cavities and Tanks

Contribution ID: 12

Type: **not specified**

Calibration-source positioning system

Saturday, 22 June 2013 15:45 (15 minutes)

This will be a review of the calibration (insertion) system for the Hyper-K detector. The talk will cover current status and design concept of the hardware as well as details regarding the CCD-source-positioning system incorporated from the Borexino design.

Primary author: Dr MANECKI, Szymon (VirginiaTech)

Presenter: Dr MANECKI, Szymon (VirginiaTech)

Session Classification: Detector Calibrations

Contribution ID: 13

Type: **not specified**

Overview and WCsim with the real HK geometry

Saturday, 22 June 2013 13:25 (20 minutes)

The current activities of the software group will be reviewed as an introduction of the software session. WCsim is a water cherenkov detector simulator which can generate cylindrical detector configuration, on the other hand, HyperK has “egg shape” cross section. We tried to include this complicated geometry into WCsim and some validation work will be presented.

Primary author: Prof. WALTER, Chris (Duke University)

Presenter: Prof. WALTER, Chris (Duke University)

Session Classification: Softwares

Contribution ID: 15

Type: **not specified**

Development of WCsim and optimization detecor parameters

Saturday, 22 June 2013 13:45 (20 minutes)

Recent developing works about WCsim will be presented. We generated simulations with several detector length to optimize the detector performance.

Primary author: Mr OKAJIMA, Yuji (Tokyo Institute of Technology)

Presenter: Mr OKAJIMA, Yuji (Tokyo Institute of Technology)

Session Classification: Softwares

Contribution ID: 16

Type: **not specified**

fiTQun and interface for WCsim

Saturday, 22 June 2013 14:05 (20 minutes)

Recent progress about fiTQun will be reported. The fiTQun was originally developed for Super-K analysis and some interface is needed to run for WCsim output. The interface between fiTQun and WCsim will be discussed.

Primary author: DE PERIO, Patrick (University of Toronto)

Presenter: DE PERIO, Patrick (University of Toronto)

Session Classification: Softwares

Contribution ID: **18**

Type: **not specified**

Prospects and plans for software

Saturday, 22 June 2013 14:25 (10 minutes)

The optimization of detector parameters are important to decide the detector design. Some ideas for optimization and plan will be discussed.

Primary author: Dr MIURA, Makoto (Kamioka Observatory, ICRR, University of Tokyo)

Presenter: Dr MIURA, Makoto (Kamioka Observatory, ICRR, University of Tokyo)

Session Classification: Softwares

Contribution ID: 19

Type: **not specified**

Geomagnetic compensation coils

Friday, 21 June 2013 16:10 (10 minutes)

I will show some update of the compensation coil study.

Primary author: Dr NAKAYAMA, Shoei (Kamioka Observatory, ICRR, University of Tokyo)

Presenter: Dr NAKAYAMA, Shoei (Kamioka Observatory, ICRR, University of Tokyo)

Session Classification: Cavities and Tanks

Contribution ID: 20

Type: **not specified**

SRN search with HK

Friday, 21 June 2013 14:25 (25 minutes)

The sensitivity of SRN in HK is reported for several cosmic ray intensity case.

Primary author: Dr YANO, Takatomi (Okayama Univ.)

Presenter: Dr YANO, Takatomi (Okayama Univ.)

Session Classification: Physics Potential

Contribution ID: 21

Type: **not specified**

An application of the neutrino oscillation to geophysics : Study of the Earth's core composition using atmospheric neutrino

Friday, 21 June 2013 13:40 (20 minutes)

Neutrino oscillations inside matter are sensitive to the electron density. On the other hand, neutrino absorption is sensitive to the mass density. The mass density distribution of the Earth's core is also inferred from seismic tomography. Therefore, neutrino oscillation can be used for a probe to determine the average atomic mass ratio A/Z of the Earth's core by comparing with the mass density.

The outer core composition is believed to consist of 90% iron and 10% light material, but it has not been measured yet. With the advent of the new-generation neutrino detector like Hyper-K, neutrino oscillation spectrometry will allow us to constrain directly the composition of the Earth's outer core.

Primary author: Dr TAKETA, Akimichi (Earthquake Research Institute)

Co-authors: Dr ROTT, Carsten (Sungkyunkwan University); Prof. TANAKA, Hiroyuki (Earthquake Research Institute)

Presenter: Dr TAKETA, Akimichi (Earthquake Research Institute)

Session Classification: Physics Potential

Contribution ID: 22

Type: **not specified**

R&D of light collection system using acrylic lens

Saturday, 22 June 2013 10:05 (15 minutes)

In the current baseline design, the photo-coverage of the HK inner tank is 20%. For the low energy neutrino measurement (for example, a precise measurement of the solar neutrino spectrum or a measurement of the day-night asymmetry of the solar neutrino flux), higher photo-coverage is desirable. This R&D is to enlarge the effective photo-coverage using light collection system. I will show the current status of test measurements for a commercially available 30cm*30cm acrylic Fresnel lens.

Primary author: Dr IKEDA, Motoyasu (Kyoto University)

Presenter: Dr IKEDA, Motoyasu (Kyoto University)

Session Classification: Photo-detectors

Contribution ID: 23

Type: **not specified**

Spallation background

Friday, 21 June 2013 14:00 (25 minutes)

A MC based estimation of spallation background in Hyper-K will be reported.

Primary author: Dr SHIMIZU, Itaru (Tohoku University)

Presenter: Dr SHIMIZU, Itaru (Tohoku University)

Session Classification: Physics Potential

Contribution ID: 24

Type: **not specified**

Performance evaluation and pre-installation calibrations of prototype photodetectors

Saturday, 22 June 2013 09:30 (15 minutes)

We prepared ten 8-inch HPDs and eight high-QE 20-inch PMTs and a part of them will be installed in a 200-ton tank for a proof-test from this summer. For the installation, a gain adjustment finished and these performance was evaluated to select the photodetectors into the tank.

Primary author: HIROTA, Seiko (Kyoto Univ.)

Presenter: HIROTA, Seiko (Kyoto Univ.)

Session Classification: Photo-detectors

Contribution ID: 25

Type: **not specified**

Status of HK water system and HK water quality

Friday, 21 June 2013 16:20 (25 minutes)

I will talk about water.

Primary author: Dr SEKIYA, Hiroyuki (ICRR/IPMU)

Presenter: Dr SEKIYA, Hiroyuki (ICRR/IPMU)

Session Classification: Water System

Contribution ID: 26

Type: **not specified**

Near Detector Considerations

Friday, 21 June 2013 11:20 (20 minutes)

Some considerations regarding the near detectors are presented. With a focus on the physics needs for the Hyper-Kamiokande-based long baseline experiment, the expected future performance, aging and needed refurbishment for the current T2K ND280 detector and possible future ideal near detector setups.

Primary author: Prof. DI LODOVICO, Francesca (Queen Mary, University of London)

Presenter: Prof. DI LODOVICO, Francesca (Queen Mary, University of London)

Session Classification: Physics Potential

Contribution ID: 27

Type: **not specified**

Status and plan for photodetector tests in a 200-ton tank

Saturday, 22 June 2013 09:10 (20 minutes)

A proof test of 8-inch HPDs and 20-inch high-QE PMTs using a 200-ton tank starts from this summer at Kamioka mine. These preparation status and a recent R&D of photosensors will be presented.

Primary author: Dr NISHIMURA, Yasuhiro (ICRR, University of Tokyo)

Presenter: Dr NISHIMURA, Yasuhiro (ICRR, University of Tokyo)

Session Classification: Photo-detectors

Contribution ID: 28

Type: **not specified**

theta_23 and delta can be measured accurately at the same time

Saturday, 22 June 2013 11:25 (20 minutes)

Primary author: Prof. MINAKATA, Hisakazu

Presenter: Prof. MINAKATA, Hisakazu

Session Classification: Physics Potential

Contribution ID: 29

Type: **not specified**

Introduction to physics session

Friday, 21 June 2013 10:30 (10 minutes)

Primary author: YOKOYAMA, Masashi (University of Tokyo)

Presenter: YOKOYAMA, Masashi (University of Tokyo)

Session Classification: Physics Potential

Contribution ID: **30**Type: **not specified**

OD calibration

Saturday, 22 June 2013 15:15 (15 minutes)

The outer detector of the Hyper-Kamikande detector needs some way to calibrate their sensor response against known light source. The detail of Super-Kamiokande OD calibration system is presented as an example of such a system. A similar system for the HK detector will be discussed along with a rough estimation of its cost.

Primary author: Dr MATSUNO, Shigenobu (University of Hawaii)

Presenter: Dr MATSUNO, Shigenobu (University of Hawaii)

Session Classification: Detector Calibrations

Contribution ID: 31

Type: **not specified**

Enhanced light collection with a wavelength shifter trap

Saturday, 22 June 2013 09:45 (20 minutes)

The baseline Hyper-K concept relies on 99,000 20" photomultiplier tubes (PMTs) to provide 20% photo-coverage. We are investigating solutions that would enhance the photo-coverage without compromising either contrast or timing resolution. Contrast roughly quantifies the fraction of photons detected that retain the Cerenkov light directional information over the total number of photons detected including photons having scattered, been reflected or reemitted. We are proposing to enclose each PMT within a box allowing direct detection of some of the UV and blue Cerenkov light, while recovering a fraction of the light missing the PMT using a combination of wavelength shifter and dichroic. Simulations shows a factor of 2 to 3 enhancement in photon collection compared to the baseline design. We will show detailed optimization results and the first steps towards building a full scale prototype.

Primary author: Dr RETIERE, Fabrice (TRIUMF)

Presenter: Dr RETIERE, Fabrice (TRIUMF)

Session Classification: Photo-detectors

Contribution ID: 33

Type: **not specified**

Registration

Friday, 21 June 2013 08:30 (30 minutes)

Session Classification: Registration

Contribution ID: 34

Type: **not specified**

Parallel-1 (Near Detector discussion)

Friday, 21 June 2013 17:30 (1h 30m)

Session Classification: Parallel Sessions

Contribution ID: 35

Type: **not specified**

Discussions

Saturday, 22 June 2013 17:00 (50 minutes)

Session Classification: Discussions

Contribution ID: 36

Type: **not specified**

Status of Gd in 200 tons, 32 ktons, and 560 ktons

Friday, 21 June 2013 16:45 (20 minutes)

Progress and status of water-related issues concerning gadolinium loading in EGADS (200 tons) will be presented, leading into a discussion on how what is being learned could be applied to Super-K's inner volume (32 ktons) and to Hyper-K (560 ktons) as well.

Primary author: Prof. VAGINS, Mark (IPMU)

Presenter: Prof. VAGINS, Mark (IPMU)

Session Classification: Water System

Contribution ID: 37

Type: **not specified**

Parallel-2 (?)

Friday, 21 June 2013 17:30 (1h 30m)

Session Classification: Parallel Sessions

Contribution ID: **38**

Type: **not specified**

R&D items of the DAQ system in HK

Saturday, 22 June 2013 11:05 (20 minutes)

Show the necessary R&D items and status of the discussions
(could be short)

Primary author: Dr HAYATO, Yoshinari (Kamioka obs., ICRR, Univ. of Tokyo)

Presenter: Dr HAYATO, Yoshinari (Kamioka obs., ICRR, Univ. of Tokyo)

Session Classification: DAQ and Electronics System

Contribution ID: 39

Type: **not specified**

Summary of near detector discussion

Saturday, 22 June 2013 16:40 (20 minutes)

Summary of near detector discussion

Primary author: Dr HARTZ, Mark (Kavli IPMU)

Presenter: Dr HARTZ, Mark (Kavli IPMU)

Session Classification: Summary of Near Detector discussion

Contribution ID: 40

Type: **not specified**

Parallel-3 (?)

Friday, 21 June 2013 17:30 (1h 30m)

Session Classification: Parallel Sessions

Contribution ID: 41

Type: **not specified**

Search for the spin-independently coupling WIMP captured in the Sun/the Earth in Hyper-Kamiokande

Friday, 21 June 2013 14:50 (20 minutes)

WIMP searches using the captured WIMP by terrestrial bodies are characterized by whether the scattering is spin-independent (in which case the WIMP couples to the mass in the nucleus) or spin-dependent (in which case the WIMP couples to the spin of the nucleus). For spin-dependent coupling case, Hyper-K solar analysis is expected to have strongest sensitivity among currently proposed detectors for search for the WIMP with mass below few tens of GeV (C. Rott's talk in 1st open meeting). In 3rd open meeting, I'd like to also present the view of spin-independent coupling case for the Sun and the Earth captured WIMP, where the sensitivity can be compared with claimed signals from several direct detectors and prospects of future detectors.

Primary author: Ms CHOI, koun (nagoya university)

Co-author: Prof. ITOW, Yoshitaka (nagoya university)

Presenter: Ms CHOI, koun (nagoya university)

Session Classification: Physics Potential

Contribution ID: 42

Type: **not specified**

J-PARC neutrino beam

Friday, 21 June 2013 09:40 (25 minutes)

The future of J-PARC neutrino beam toward 750 kW and beyond will be reported.

Primary author: TADA, Sho (KEK)

Presenter: TADA, Sho (KEK)

Session Classification: J-PARC and Beamline

Contribution ID: 43

Type: **not specified**

Meeting photo

Saturday, 22 June 2013 17:50 (5 minutes)

Session Classification: Discussions

Contribution ID: 44

Type: **not specified**

NNN13

Saturday, 22 June 2013 17:55 (5 minutes)

Session Classification: Discussions