

MANTS-GNN Meeting 2014

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Book of Abstracts

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Optical Sensors and Technology / 0**IceVeto: A high energy extension for IceCube****Author:** Jan Auffenberg¹¹ *o=uwmad,ou=Institutions,dc=icecube,dc=wisc,dc=edu*

Neutrino Astronomy in the Southern Hemisphere: Study of a cosmic-ray veto for the IceCube neutrino observatory.

ICECUBE is the world's largest high-energy neutrino observatory, built at the South Pole. The main backgrounds for extraterrestrial neutrino detection in ICECUBE are cosmic ray (CR) induced extensive air showers (EAS). One way to suppress these backgrounds in ICECUBE is to look at particles that have traversed the whole Earth, leaving not only astrophysical but also atmospheric neutrinos (AN). In the southern sky, the CR muon background dominates the neutrino spectrum because high-energy muons will penetrate the overburden of ice above the detector.

EAS can be detected with air shower arrays at the surface. Such an array can be used to veto the CR muons reaching the deep detector. In particular, such a veto detector can suppress even the AN background, preferably covering a large solid angle including the galactic plane. This scenario motivates studies to determine the cost and physics potential of a veto extension, IceVeto.

Initial estimates indicate that such a veto detector would more than double the discovery potential of current point source analysis in the southern sky for far less than a tenth of the cost of IceCube. With the additional detector IceVeto, IceCube would be able to explore the galactic center and galactic plane for extraterrestrial neutrino detection.

We propose detailed simulation studies to show the potential and feasibility of IceVeto and to develop prototypes for detector constructions.

These studies can be largely done independently of tests at the South Pole, in particular because of the immense experience with detector systems such as IceCube and AUGER and the already existing infrastructure at the RWTH Aachen.

Due to my experience with IceCube and IceTop, specifically with veto techniques, I am coordinating the R&D activities of the IceCube Collaboration for surface extensions and an ideal candidate to lead a research group.

Summary:

Extend IceCube for muon neutrino detection from the southern sky.

Cascade Reconstruction / 1**IC79/86 Partially contained cascades****Author:** Achim Stoessl¹¹ *o=desy-zeuthen,ou=Institutions,dc=icecube,dc=wisc,dc=edu*

An overview over the status of using the partially contained cascade channel for IceCube's measurement of astrophysical neutrinos.

Point Sources / Self Veto / 2**The Generalized Neutrino Self-Veto for Neutrino Telescopes****Author:** Kyle Jero¹

¹ *o=uwrf,ou=Institutions,dc=icecube,dc=wisc,dc=edu*

Searches for astrophysical neutrinos have to contend with a large background of atmospheric neutrinos. In searches for up-going neutrinos, this background is irreducible. In veto-based searches, however, down-going atmospheric neutrinos are removed when the veto is triggered by muons produced in the same air shower, leaving only astrophysical neutrinos at high energies and small zenith angles. However, this veto is only guaranteed for muon neutrinos. There is a possibility for muons from other branches of the shower to contribute and offer a veto for atmospheric electron neutrinos and atmospheric neutrinos from prompt decays. To verify the veto probability for these neutrinos an analytic formula was derived from lepton yields and modifications to CORSIKA were made. The modification to CORSIKA improves upon the simulation's speed and file size by actively determining when showers are not interesting to the analysis and stopping the showers simulation and moving on to the next one.

PINGU / ORCA: II / 3

Calibration strategy in ice

Author: Martin Jurkovic¹

¹ *TU Muenchen*

PINGU / ORCA : I / 4

Reconstruction methods & performances (tracks, cascades, PID) in ice

Author: Joao Pedro A M de Andre¹

¹ *o=psu,ou=Institutions,dc=icecube,dc=wisc,dc=edu*

Atmospheric Neutrinos / Charm / 5

Atmospheric neutrinos and charm production

Author: Chang Hyon Ha¹

¹ *o=lbl,ou=Institutions,dc=icecube,dc=wisc,dc=edu*

Overview / FoM / Data Policy - Christian Spiering and Erik Blaufuss, conveners / 6

Data sharing and data policies

Author: Erik Blaufuss¹

¹ *o=umd,ou=Institutions,dc=icecube,dc=wisc,dc=edu*

I'll try to discuss the issues associated with wider sharing of neutrino telescope data.

Overview / FoM / Data Policy - Christian Spiering and Erik Blaufuss, conveners / 7

Overview on plans at all sites and GNN report

Author: Christian Spiering¹

¹ *DESY*

The first part of this talk will give the basic information on plans at all three sites: South Pole, Mediterranean Sea, Lake Baikal. This part is intended to avoid 3 separate conference-like talks which typically eat up much of the time which is better used for special items.

The second part of the talk is devoted to GNN activities and the GNN session of the day before.

Cascade Reconstruction / 8

Cascade reconstruction and angular resolution in GVD

Author: Zhan-Arys Dzhilkibaev¹

¹ *Institute for nuclear research, Moscow*

Review of cascade reconstruction in GVD.

PINGU / ORCA : I / 10

ORCA - configuration and plans

Author: Juergen Brunner¹

¹ *o=desy-zeuthen,ou=Institutions,dc=icecube,dc=wisc,dc=edu*

ORCA - configuration and plans

Point Sources / Self Veto / 11

KM3NeT point-like sources

Author: Agata Trovato¹

¹ *LNS - INFN*

KM3NeT point-like sources

PINGU / ORCA: II / 12

Muon rejection studies for ORCA

Author: Luigi Antonio Fusco¹

¹ *INFN and University of Bologna*

The possible strategy for atmospheric muon rejection with the ORCA detector is shown and an outlook of the future work on this item is presented.

Point Sources / Self Veto / 13

KM3NeT Diffuse Fluxes sensitivity studies

Author: Luigi Antonio Fusco¹

¹ *INFN and University of Bologna*

The present status of diffuse flux studies for the KM3NeT detector is presented. The latest developments on the track channel and, separately, on the cascade channel have shown that KM3NeT would have extremely good performances in the possible observation of an IceCube-like signal, and an outlook of future work will be given.

PINGU / ORCA: II / 14

Comparison of ORCA and PINGU Sensitivity Studies

Authors: Lukas Schulte¹; Martijn Jongen²

¹ *o=bonn,ou=Institutions,dc=icecube,dc=wisc,dc=edu*

² *Nikhef*

We present an overview and comparison of the mass hierarchy sensitivity studies performed by PINGU and ORCA.

Furthermore we discuss an ongoing joint study that aims to get consistent results from the two analyses.

PINGU / ORCA : I / 15

PINGU configuration and plans

Authors: Darren Grant¹; Doug Cowen²

¹ *U of Alberta*

² *o=psu,ou=Institutions,dc=icecube,dc=wisc,dc=edu*

Presented will be the current status of the PINGU configuration and development plans.

Point Sources / Self Veto / 16

Combined IceCube-ANTARES point-source analysis

Author: Javier Barrios Marti¹

¹ *IFIC*

Current status of the combined IceCube-ANTARES point-source analysis over the Southern Hemisphere.

Atmospheric Neutrinos / Charm / 17

Charm with High Energy Muons in IceCube - Summary of P.Berghaus' results

Author: Patrick Berghaus¹

Co-author: Hans-Peter Bretz²

¹ *DESY Zeuthen*

² *o=desy-zeuthen,ou=Institutions,dc=icecube,dc=wisc,dc=edu*

This talk gives a summary of an analysis to measure the high energy muon spectrum performed on one year of data of the IceCube detector. The main background for single high energy muons are high-multiplicity bundles comprised of lower energy muons. This analysis attempts to separate single muons from muon bundles through their different energy loss profiles. A preliminary best fit on the muon spectrum and the prompt component is presented.

Atmospheric Neutrinos / Charm / 18

hadron and charm production in the atmosphere - Introductory remarks from ISVHECRI 2014

Author: Paolo Desiati¹

¹ *o=uwmad,ou=Institutions,dc=icecube,dc=wisc,dc=edu*

This is an introduction to the Charm Production Session of the MANTS 2014 Meeting. It includes a brief summary of hadronic production in extensive air shower, including heavy quark production.

Optical Sensors and Technology / 19

pDOM for Next Generation IceCube

Author: John Kelley¹

¹ *UW Madison*

pDOM for Next Generation IceCube

Atmospheric Neutrinos / Charm / 21

Contribution of Kshort to the flux of atmospheric electron neutrinos

Author: Thomas Gaisser¹

Co-author: Spencer Klein²

¹ *University of Delaware*

² *LBNL*

We report on a calculation of the contribution of the rare Ke3 decay of the Kshort, which becomes comparable to the contribution from Klong and charged kaons above 100 TeV.

Optical Sensors and Technology / 22

mDOM for Next Generation IceCube

Author: Alexander Kappes¹

¹ *ECAP*

Report on prototype of mDOM for Next Generation IceCube in Erlangen

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A 2-PMT version for Next Generation IceCube DOM

Author: Roman Gaior¹

¹ *Chiba University*

Design and test results for a 2-PMT version for Next Generation IceCube DOM are presented

Optical Sensors and Technology / 24

The Baikal Optical Module for GVD

Author: Vladimir Aynutdinov¹

¹ *INR Moscow*

Design and results from the engineering array of the DOM of GVD

Optical Sensors and Technology / 25

The WOM approach for Next Generation IceCube

Author: Sebastian Boeser¹

¹ *University Mainz*

A wavelength shifter based design for the NGIC DOM is presented

PINGU / ORCA : I / 26

Reconstruction Methods & Performances in Water

Author: Jannik Hofstaedt¹

¹ *ECAP*

Reconstruction methods used in the ORCA feasibility study will be described. The performance of the track & shower reconstruction, and the FlavorID will shown.

Cascade Reconstruction / 27

Search for a cosmic neutrino flux with showers in 6 years of ANTARES data

Author: Thomas Eberl¹

Co-author: Florian Folger²

¹ *Erlangen Centre for Astroparticle Physics*

² *Mr*

We have developed a shower or cascade reconstruction algorithm and we have searched for shower-like events in 6 years (2007 - 2012) of ANTARES data. The performance of the algorithm and results of a search for a diffuse cosmic neutrino flux will be presented.

Parallel Session Summaries / 28

ANTARES constraints to a Galactic component of the HESE

Author: maurizio spurio¹

¹ *University of Bologna and INFN*

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Atmospheric Neutrinos / Charm / 29**Self-veto and charm production with HE neutrinos in IceCube****Author:** Gary Binder¹¹ *UC Berkeley***Atmospheric Neutrinos / Charm / 30****Review of charm production in colliders (RHIC, ALICE, LHCb,)****Author:** Alessandro Grelli¹¹ *University of Utrecht***Atmospheric Neutrinos / Charm / 31****High energy hadronic interaction models bridging accelerator with cosmic ray physics****Author:** Anatoli Fedynitch¹¹ *o=uwmad,ou=Institutions,dc=icecube,dc=wisc,dc=edu*

In this talk I will present the relevance of accelerator data and for cosmic ray physics. The production of charm in hadronic interaction models will be introduced and comparisons of model predictions and available data shown.

Working Group on Performance and Figure of Merit / 32**FoM discussion/overview/ideas****Author:** Claudio Kopper¹¹ *o=uwmad,ou=Institutions,dc=icecube,dc=wisc,dc=edu*

(for the Saturday 11:15 parallel session)

Parallel Session Summaries / 33

Summary of the ORCA/PINGU

Author: Antoine Kouchner¹

Co-author: Marek Kowalski²

¹ *APC-University Paris Diderot*

² *o=bonn,ou=Institutions,dc=icecube,dc=wisc,dc=edu*

Summary of the 2 ORCA/PINGU parallel sessions

PINGU / ORCA: II / 34

Muon rejection in PINGU

Author: Elisa Resconi¹

Co-author: Andreas Gross²

¹ *o=munchen,ou=Institutions,dc=icecube,dc=wisc,dc=edu*

² *TU Munich*

Study of muon rejection in PINGU

Atmospheric Neutrinos / Charm / 35

Atmospheric neutrinos and diffuse fluxes of cosmic neutrinos with the ANTARES detector.

Author: Annarita Margiotta¹

¹ *Universita' di Bologna and Sezione INFN di Bologna*

The undersea neutrino telescope ANTARES measured the atmospheric muon neutrino energy spectrum using data collected in 4 years of data taking. A short review of the methodology and of the results will be given.

The search for diffuse fluxes of cosmic neutrinos using track-like events will be presented as well.

Overview / FoM / Data Policy - Christian Spiering and Erik Blaufuss, conveners / 36

Figure of Merit overview

Author: Clancy James¹

¹ *University of Erlangen-Nuernberg*

I provide an overview of the Figure of Merit (FoM) group

Cascade Reconstruction / 37

high energy cascade reconstruction in km3net

Author: aart heijboer¹

¹ *nikhef*

The methods to reconstruct cascades in km3net will be discussed.

Optical Sensors and Technology / 38

the km3net multi-pmt DOM

Author: aart heijboer¹

¹ *nikhef*

I will discuss the km3net multi-pmt DOM: motivation and some aspects of the technical implementation.

Parallel Session Summaries / 39

Summary of Optical Sensors & Technology

Author: Timo Karg¹

¹ *DESY*

Point Sources / Self Veto / 40

Muon neutrino searches at high energies

Author: Albrecht Karle¹

¹ *o=uwmad,ou=Institutions,dc=icecube,dc=wisc,dc=edu*

I will discuss some recent muon astrophysical neutron searches and results with IceCube. I will focus on improvements in the Southern hemisphere and add a discussion about the presence of a diffuse flux and the absence of point sources.

Optical Sensors and Technology / 41**Design and studies for a new optical module for IceCube high energy extension**

Authors: Aya Ishihara¹; Hans Niederhausen²; Shigeru Yoshida¹

Co-author: Romain Gaior³

¹ *o=chiba,ou=Institutions,dc=icecube,dc=wisc,dc=edu*

² *Stony Brook Univ.*

³ *Chiba University*

We present the design and the first studies on a double PMT optical module in the scope of IceCube high energy extension.

Parallel Session Summaries / 42**Point source / Diffuse / Cascade summary**

Author: Markus Ackermann¹

¹ *o=desy-zeuthen,ou=Institutions,dc=icecube,dc=wisc,dc=edu*

I will summarize the sessions mentioned in the title.

Parallel Session Summaries / 43**Summary of Charm Production Session**

Author: Paolo Desiati¹

¹ *o=uwmad,ou=Institutions,dc=icecube,dc=wisc,dc=edu*

this is the summary of the Charm Production Parallel Session

Parallel Session Summaries / 44**Cascade Session Summary**

Author: Thomas Eberl¹

¹ *Erlangen Centre for Astroparticle Physics*

Cascade Session Summary