

**NuFact'11  
Factories,**

**on Neutrino  
Beta-beams**



**Abstracts book**

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Abstract ID : 7

# Beaming neutrino across the Earth to Deep Core to test neutrino mixing parameters and CPT violation

Content :

Twenty GeV Neutrino crossing along the Earth by longest base line (CERN-Deep Core or FNL-Deep Core) offer the most powerful tool to test neutrino (muon-tau) mixing masses and angles. An Opera-like experiment at 1% size and flux may lead to a few hundreds events a year of tau appearance or and muon suppression or disappearance. The large (11000 km) distance neutrino flux dilution is widely overcome by largest (tens Megaton) Deep Core mass and by a complete oscillation conversion. A sharp and silent atmospheric neutrino experiment may provide a test also to Minos like CPT violation claim.

Primary authors : Prof. FARGION, Daniele (Physics Department, Rome University 1 and INFN Rome)

Co-authors : Mr. D'ARMIENTO, Daniele (Physics Departm.)

Presenter : Prof. FARGION, Daniele (Physics Department, Rome University 1 and INFN Rome)

Track classification :

Contribution type : --not specified--

Submitted by : Prof. FARGION, Daniele

Submitted on Sunday 27 March 2011

Last modified on : Sunday 27 March 2011

Comments :

A main description of the proposal maybe find in  
arXiv:1012.3245

Title: Beaming neutrino and antineutrinos across the Earth to focus muon-tau flavor mixing and to disentangle CPT violation puzzle

by Daniele Fargion, Daniele D'Armiento, Paolo Desiati, Paolo Paggi

Status : SUBMITTED

Track judgments :

Abstract ID : 8

# WG1 Daya Bay's First Experimental Hall Coming On Line

Content :

The Daya Bay reactor neutrino experiment is designed to measure the last unknown neutrino mixing angle  $\theta_{13}$  with a sensitivity of  $\sin^2 2\theta_{13} < 0.01$  through a measurement of the relative rates and energy spectra of reactor antineutrinos at different baselines. Eight identical liquid scintillator antineutrino detectors (ADs) will be installed in three experimental halls. The first experimental hall, Daya Bay near site, will come on line in this summer, which is ~360m away from Daya Bay reactors and has 98m rock overburden, where two ADs will be installed in a water pool with at least 2.5m water shielding. 840 antineutrino events per AD per day are detected with 20-ton target mass. The water pool is divided into inner and outer parts and equipped with PMTs to serve as Cherenkov detector. Resistive Plate Chambers (RPCs) covers the water pool to provide additional Muon tagging. We will describe the design, construction, commissioning and preliminary performance of the Daya Bay detectors.

Primary authors : Mr. WANG, Zhimin (Institute of high energy physics, Beijing)

Co-authors :

Presenter : Mr. WANG, Zhimin (Institute of high energy physics, Beijing)

Track classification :

Contribution type : --not specified--

Submitted by : WANG, Zhimin

Submitted on Wednesday 25 May 2011

Last modified on : Sunday 05 June 2011

Comments :

Preliminary version  
For Dayabay

Status : SUBMITTED

Track judgments :

Abstract ID : 9

# WG3 neutrino flux monitoring in the neutrino factory

Content :

The presentation will summarize the beam controls necessary to refine the flux in the neutrino factory with a precision of  $10^{-3}$ . A polarimeter, a beam divergence measurement and a beam current measurement will do the job

Primary authors : BLONDEL, Alain (DPNC)

Co-authors :

Presenter : BLONDEL, Alain (DPNC)

Track classification :

Contribution type : --not specified--

Submitted by : BLONDEL, Alain

Submitted on Friday 27 May 2011

Last modified on : Friday 27 May 2011

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 10

# Poster "Dissipative Effects in Neutrino Oscillation"

## Content :

We study neutrino oscillation taking into account the interaction with environment where open quantum system approach is rigorously used. This changes the usual pattern of oscillation because decoherence and relaxation effects can occur in the subsystem of neutrinos. These dissipative effects are added with only one phenomenological parameter constrained by complete positivity evolution. In terms of Majorana neutrinos, the oscillation probabilities can exhibit, even for two flavor neutrinos, a CP-violation effect in vacuum and matter. Both vacuum and matter effects are derived and presented in this work. We compare the obtained probabilities in vacuum with MINOS data. We estimate a limit to the phenomenological dissipative parameter and to the CP Majorana phase. Also, a genuine dissipative effect to three families is presented.

Primary authors : Dr. OLIVEIRA, Roberto (Universidade Estadual de Campinas)

Co-authors : Prof. GUZZO, Marcelo (Universidade Estadual de Campinas)

Presenter : Dr. OLIVEIRA, Roberto (Universidade Estadual de Campinas)

Track classification :

Contribution type : --not specified--

Submitted by : OLIVEIRA, Roberto

Submitted on Monday 30 May 2011

Last modified on : Wednesday 01 June 2011

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 11

# The Very-Low-Energy Neutrino Factory

Content :

Recent results from MiniBooNE and new calculations regarding the anti-neutrino flux from reactors provide exciting new motivation to study neutrino oscillations physics at L/E  $\sim 1$ . Using a targeting system similar to the one used for MiniBooNE and a muon storage/decay ring with central E of  $\sim 1.5$  GeV gives the capability to measure electron neutrino disappearance with 1% precision using a suitably designed near detector and the MiniBooNE detector as the far detector. This talk will describe the overall concept including targeting, collection and ring design and will give estimated event rates (based on MiniBooNE as the far detector). Finally, we will describe some possible near detector configurations and far detector options.

Primary authors : Prof. BROSS, Alan (Fermilab)

Co-authors : ANKENBRANDT, Charles (Muons Inc./Fermilab) ; POPOVIC, Milorad (Fermilab) ; NEUFFER, David (Fermilab)

Presenter : Prof. BROSS, Alan (Fermilab)

Track classification :

Contribution type : --not specified--

Submitted by : BROSS, Alan

Submitted on Tuesday 31 May 2011

Last modified on : Tuesday 31 May 2011

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 12

# Low Energy Signatures of the TeV Scale See-Saw Mechanism

Content :

We study the phenomenological consequences of the type I see-saw model, when the right-handed neutrinos have masses at the electroweak scale. Concretely, we discuss the prospects to produce and detect the right-handed neutrinos at colliders in view of the present constraints from electroweak precision observables and rare muon decays. We find that the most promising experiments to observe the first signatures of such models are the searches for lepton flavour violation and for neutrinoless double beta decay.

Primary authors : IBARRA, Alejandro (TUM)

Co-authors :

Presenter : IBARRA, Alejandro (TUM)

Track classification :

Contribution type : --not specified--

Submitted by : IBARRA, Alejandro

Submitted on Tuesday 31 May 2011

Last modified on : Tuesday 31 May 2011

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 13

# Large Extra Dimensions, Neutrino Oscillations and the Reactor Antineutrino Anomaly

Content :

We consider a model where sterile neutrinos can propagate in a large compactified extra dimension giving rise to Kaluza-Klein (KK) modes and the Standard Model left-handed neutrinos are confined to a 4-dimensional spacetime brane. The KK modes mix with the standard neutrinos modifying their oscillation pattern. To set limits on and estimate sensitivities to the size of the largest extra dimension, we examine former, current and future experiments. We also investigate the recent reactor antineutrino anomaly in this context.

Primary authors : MACHADO, Pedro (University of São Paulo and CEA-Saclay) ; Prof. NUNOKAWA, Hiroshi (PUC-Rio) ; Prof. ZUKANOVICH FUNCHAL, Renata (University of São Paulo) ; Mr. PEREIRA DOS SANTOS, Fábio Alex (PUC-Rio)

Co-authors :

Presenter : MACHADO, Pedro (University of São Paulo and CEA-Saclay)

Track classification :

Contribution type : --not specified--

Submitted by : MACHADO, Pedro

Submitted on Monday 06 June 2011

Last modified on : Monday 06 June 2011

Comments :

I would like to present this work in the following working group: Oscillation Physics working group I.

Status : SUBMITTED

Track judgments :

Abstract ID : 14

# The Daya Bay Neutrino Experiment: An Overview

Content :

The phenomenon of neutrino flavor oscillations is now well-established. Mixing among the three flavors is characterized by three mixing angles, with  $\theta_{13}$  being the only presently unknown angle. A precise measurement of  $\theta_{13}$  can be made by utilizing a powerful nuclear reactor as the anti-neutrino source, going deep underground to reduce the background, and building "identical" near and far detectors to minimize the systematics. We are building such an experiment at the Daya Bay nuclear power plant in south China. This project, known as the Daya Bay Neutrino Experiment, is making steady progress. The civil construction and the detector assembly are underway, and we expect to start data taking in the first near experimental hall this summer. In this talk, I will stress the physics motivation of such a measurement, introduce you to the world of making precise oscillation measurement with reactor neutrinos, and look into the near future of the Daya Bay experiment.

Primary authors : Dr. LIU, Jianguai (Shanghai Jiao Tong University)

Co-authors :

Presenter : Dr. LIU, Jianguai (Shanghai Jiao Tong University)

Track classification :

Contribution type : --not specified--

Submitted by : LIU, Jianguai

Submitted on Wednesday 08 June 2011

Last modified on : Wednesday 08 June 2011

Comments :

On behalf of the Daya Bay Collaboration.

If possible, please schedule this talk and Zhimin Wang's "Daya Bay's First Experimental Hall Coming On Line" back-to-back.

Status : SUBMITTED

Track judgments :

Abstract ID : 36

# WG2 Optical Systems for Liquid Argon TPC Detectors

## Content :

The MicroBooNE experiment is a 170 ton scale liquid argon TPC detector which will run in the booster neutrino beam at Fermilab, starting in 2013. As well as a TPC system which will perform high resolution 3D tracking using ionization charge deposits in the argon bulk, the MicroBooNE experiment incorporates an optical system to measure scintillation light production. The optical system consists of 30 photomultiplier tubes mounted behind acrylic plates, which are coated by a wavelength shifting film. 128nm scintillation light, which is a byproduct of the ionization process, can thus be detected by the system.

There are multiple benefits to incorporating an optical system into an LArTPC detector. It can be used as an effective trigger, since the data rate and channel count is low, and noise in the PMT system is likely to be uncorrelated with noise in the TPC system. Charge drift in a TPC is slow whereas scintillation light propagation is fast, thus an accurate event time and position in the drift direction can be determined, the former being of particular importance in a pulsed beam like the Booster. And finally, the nontrivial time structure of scintillation production can, in some cases, be used to augment the particle identification capabilities of the TPC based event reconstruction methods.

I will discuss the current status of both the PMT assembly hardware and the supporting software algorithms which have been developed for MicroBooNE, and mention their relevance to future liquid argon TPC detectors.

Primary authors : Mr. JONES, Benjamin (MIT)

Co-authors :

Presenter : Mr. JONES, Benjamin (MIT)

Track classification :

Contribution type : --not specified--

Submitted by : JONES, Benjamin

Submitted on Tuesday 14 June 2011

Last modified on : Tuesday 21 June 2011

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 59

# Neutrino Factory Front End and Extensions

Content :

The (International Design Report) IDR neutrino factory scenario for capture, bunching, phase-energy rotation and initial cooling of mu's produced from a proton source target is presented. It requires a drift section from the target, a bunching section and a phase-energy rotation section leading into the cooling channel. The rf frequency changes along the bunching and rotation transport in order to form the mu's into a train of equal-energy bunches suitable for cooling and acceleration. Optimization and variations are discussed. Important concerns are rf limitations and beam losses; mitigation procedures are described. Extensions of the method for a muon collider front end and bunch combiner are discussed.

Primary authors : NEUFFER, David (Fermilab)

Co-authors : Dr. ROGERS, Christopher (RAL - STFC) ; Dr. YOSHIKAWA, Cary (Muons, Inc.) ; Dr. SNOPOK, Pavel (IIT)

Presenter : NEUFFER, David (Fermilab)

Track classification :

Contribution type : --not specified--

Submitted by : NEUFFER, David

Submitted on Thursday 16 June 2011

Last modified on : Thursday 16 June 2011

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 60

# WG2 Gamma-ray production in NC interactions

Content :

In neutral current (NC) neutrino scattering off nucleus, protons and neutrons contribute almost equally to the cross section (44 and 56%, respectively). To detect the NC interactions one observes the knockout protons or the secondary interactions of neutrons. However, the gamma-rays, produced in de-excitation of residual nucleus, may provide an additional signal for detection of neutral-current events, e.g. in water Cherenkov detectors. We will describe in detail the example of the NC nucleon knockout from  $p_{3/2}$  shell of the oxygen nucleus, showing that this process, contributing  $\sim 42\%$  of the total  $O(\nu, \nu)$  cross section at neutrino energy 600 MeV, yields a narrow peak of gamma rays of energy 6.3 MeV with branching ratio 100%.

Primary authors : ANKOWSKI, Artur ("Sapienza" Universita` di Roma)

Co-authors :

Presenter : ANKOWSKI, Artur ("Sapienza" Universita` di Roma)

Track classification :

Contribution type : --not specified--

Submitted by : ANKOWSKI, Artur

Submitted on Monday 20 June 2011

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Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 61

# The SuperBeam plus Beta Beam Combination

Content :

WG1: The SuperBeam plus Beta Beam combination is very powerful as one needs only three of the available four appearance channels to solve for the degeneracies for Standard Model neutrinos. This allows for the extra channel to check the consistencies

of the current picture and also allows for the possibilities of using the combination to search for physics beyond, such as NSI, this standard picture. All of this will be demonstrated in this talk.

Primary authors : PARKE, Stephen (Fermi National Accelerator Lab. (Fermilab))

Co-authors :

Presenter : PARKE, Stephen (Fermi National Accelerator Lab. (Fermilab))

Track classification :

Contribution type : --not specified--

Submitted by : PARKE, Stephen

Submitted on Monday 20 June 2011

Last modified on : Monday 20 June 2011

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 62

# Neutrinoless double beta decay in seesaw models (talk@WG1)

Content :

We study the general phenomenology of neutrinoless double beta decay in seesaw models. In particular, we focus on the dependence of the neutrinoless double beta decay rate on the mass of the extra states introduced to account for the Majorana masses of light neutrinos. For this purpose, we compute the nuclear matrix elements as functions of the mass of the mediating fermions and estimate the associated uncertainties. We then discuss what can be inferred on the seesaw model parameters in the different mass regimes and clarify how the contribution of the light neutrinos should always be taken into account when deriving bounds on the extra parameters. Conversely, the extra states can also have a significant impact, cancelling the Standard Model neutrino contribution for masses lighter than the nuclear scale and leading to vanishing neutrinoless double beta decay amplitudes even if neutrinos are Majorana particles. We also discuss how seesaw models could reconcile large rates of neutrinoless double beta decay with more stringent cosmological bounds on neutrino masses.

Primary authors : Dr. BLENNOW, Mattias (Max-Planck-Institut for Physik (Werner-Heisenberg-Institut)) ; Dr. FERNANDEZ-MARTINEZ, Enrique (CERN) ; Dr. LOPEZ-PAVON, Jacobo (IPPP, Durham University) ; Dr. MENENDEZ, Javier (Institut for Kernphysik, Technische Universitat Darmstad)

Co-authors :

Presenter : Dr. LOPEZ-PAVON, Jacobo (IPPP, Durham University)

Track classification :

Contribution type : --not specified--

Submitted by : LOPEZ PAVON, Jacobo

Submitted on Tuesday 21 June 2011

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Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 63

# Axial and Vector Structure Functions for Lepton-Nucleon Scattering

Content :

We present an updated model for inelastic neutrino- and electron-nucleon scattering cross sections using effective leading order parton distribution functions with a new scaling variable  $x_{i_w}$ . Updated model on the axial-vector structure functions as well as

vector structure functions will be presented. Our model describes all inelastic charged lepton-nucleon scattering (including resonance) data (HERA/NMC/BCDMS/SLAC/JLab) ranging from very high  $Q^2$  to very low  $Q^2$  and down to the photo-production region. The model describes existing inelastic neutrino-nucleon scattering measurements, and has been developed to be used in analysis of neutrino oscillation experiments in the few GeV region.

(additional details [arXiv:1011.6592](https://arxiv.org/abs/1011.6592) [hep-ph])

Primary authors : Dr. YANG, Un-ki (University of Manchester)

Co-authors : Prof. BODEK, Arie (University of Rochester)

Presenter : Dr. YANG, Un-ki (University of Manchester)

Track classification :

Contribution type : --not specified--

Submitted by : YANG, Un Ki

Submitted on Tuesday 21 June 2011

Last modified on : Tuesday 21 June 2011

Comments :

Status : SUBMITTED

Track judgments :

Abstract ID : 64

# WG2 Neutrino interaction measurements using T2K Near Detectors

Content :

The T2K near detectors provide a rich facility for measuring neutrino interactions in a high-flux environment. This talk will discuss the near detector CC-inclusive normalization analysis for the T2K oscillation result in detail, along with the present result, and describe the plan for its extension to more sophisticated measurements. Selection criteria for CCQE interactions will be presented, as will a strategy for calculating cross-section difference between plastic scintillator and water. The unique capacities of the near detectors to measure other exclusive CC and NC channels in a narrow-band off-axis beam will also be explored.

Primary authors : Mr. BROOK-ROBERGE, Daniel (University of British Columbia)

Co-authors :

Presenter : Mr. BROOK-ROBERGE, Daniel (University of British Columbia)

Track classification :

Contribution type : --not specified--

Submitted by : BROOK-ROBERGE, Daniel

Submitted on Tuesday 21 June 2011

Last modified on : Tuesday 21 June 2011

Comments :

as requested by T2K Speakers' Board

Status : SUBMITTED

Track judgments :

Abstract ID : 65

## WG1 talk: NonStandard Interactions at LEP or the LHC?

Content :

The New Physics which induces dimension eight Non-Standard neutrino Interactions should arise at a mass scale below a few TeV. We explore potential collider signals of such New Physics.

We show that if dangerous dimension six operators vanish due to a cancellation, then double-derivative dimension eight charged lepton operators arise, and collider bounds impose  $\varepsilon \sim .1$  to  $10^{-3}$ . Secondly, the  $\nu^2 \overline{\nu}_a \nu_b$

legs of an NSI operator can be related via the Equivalence Theorem to  $W^+W^- e_a^+ e_b^-$ , so we study the sensitivity of  $pp \rightarrow W^+W^- e_a^+ e_b^-$  at the LHC in a  $Z'$  model that could induce NSI.

Primary authors : DAVIDSON, Sacha (Institut de Physique Nucleaire de Lyon (IPNL)-Universite Claude)

Co-authors :

Presenter : DAVIDSON, Sacha (Institut de Physique Nucleaire de Lyon (IPNL)-Universite Claude)

Track classification :

Contribution type : --not specified--

Submitted by : DAVIDSON, Sacha

Submitted on Wednesday 22 June 2011

Last modified on : Wednesday 22 June 2011

Comments :

This is work in progress with Veronica Sanz; its not that clear we will have much to say. If you have lots of other interesting talks, maybe you don't need this one :)

Status : SUBMITTED

Track judgments :

Abstract ID : 66

# Performance of the T2K Near Detectors

Content :

The Near Detector suite of the T2K experiment is a crucial component of the experiment. The performance of the detectors in the first year of operation and the first results will be presented.

Primary authors : Dr. MCCAULEY, Neil (University of Liverpool)

Co-authors :

Presenter : Dr. MCCAULEY, Neil (University of Liverpool)

Track classification :

Contribution type : --not specified--

Submitted by : MCCAULEY, Neil

Submitted on Thursday 23 June 2011

Last modified on : Thursday 23 June 2011

Comments :

I have been selected by the T2K collaboration to give this talk as requested by the NuFact11 organisers.

Status : SUBMITTED

Track judgments :