

# NuInt12 : Eighth International Workshop on Neutrino-Nucleus Interactions in the Few-GeV Region



## Report of Contributions

Contribution ID: **21**

Type: **not specified**

## Coffee break

Contribution ID: 23

Type: **not specified**

## Opening

*Monday, 22 October 2012 08:55 (35 minutes)*

**Primary author:** Dr DA MOTTA, Hélio (CBPF)

**Presenter:** Dr DA MOTTA, Helio (CBPF)

Contribution ID: 24

Type: Poster

## A-dependence of weak nuclear structure functions

Thursday, 25 October 2012 18:00 (1h 30m)

We shall present the results for the ratio of weak nuclear structure functions  $\frac{F_2^A}{F_2^{proton}}$  and  $\frac{F_3^A}{F_3^{proton}}$ , where  $A$  is the different nuclear targets like  ${}^2_1D$ , CH,  $H_2O$ ,  ${}^{56}Fe$  and  ${}^{208}Pb$  which are being used in the ongoing *Miner $\nu$ A* experiment at Fermilab.

We have studied these nuclear structure functions using relativistic nuclear spectral function which incorporate Fermi motion, nuclear binding, and nucleon correlations. We have also included the pion and rho meson cloud contributions calculated

from a microscopic model for meson-nucleus self-energies. Shadowing and anti-shadowing effects have also been taken into account.

The deuteron structure functions have been calculated using the same formulas as used for the weak nuclear structure functions, but performing the convolution with the deuteron wave function squared instead of the spectral function. For the numerical calculations, parton distribution functions for the nucleons have been taken from the parametrization of CTEQ Collaboration (CTEQ6.6) and we have performed the calculations at LO as well as at NLO.

The details of the model are given in Refs.

1.  $\nu(\bar{\nu})$ -208Pb deep inelastic scattering.  
H. Haider, I. Ruiz Simo and M. Sajjad Athar  
Phys. Rev. C 85 (2012) 055201.
2. Nuclear medium effects in  $\nu(\bar{\nu})$ -nucleus deep inelastic scattering.  
H. Haider, I. Ruiz Simo, M. Sajjad Athar and M. J. Vicente Vacas  
Phys. Rev. C 84 (2011) 054610

### Summary

We find that the nuclear medium effects like Fermi motion and binding energy corrections are the same in  $F_2$  and  $F_3$  nuclear structure functions which have been incorporated by using the spectral function obtained for nuclear matter and implemented in nuclei using the local-density approximation. The differences in our results for  $F_2$  and  $F_3$  are due to the meson cloud contributions in the  $F_2$

structure function whereas in the  $F_3$  structure function they are absent. We have observed that the effect of meson clouds are large at low and intermediate  $x$ .

Furthermore, the shadowing effects in  $F_2$  and  $F_3$  structure functions are different.

Thus it is not appropriate to take the same correction factor for the  $F_2$  and the  $F_3$  nuclear structure functions.

The ratios of structure functions for different nuclei are not the same. This study may be useful in understanding the medium effects in the nuclear structure functions when the results from *Miner $\nu$ A* would come up. Also this study is important in the incorporation of medium correction for the deep inelastic scattering presently considered in the Neutrino Monte Carlo event generators.

**Primary author:** Ms HAIDER, Huma (Aligarh Muslim University)

**Co-authors:** Dr RUIZ SIMO, I. (Departamento de Física Atómica Molecular y Nuclear, Universidad de Granada, E-18071 Granada, Spain); Prof. ATHAR, M.Sajjad (Aligarh Muslim University)

**Presenters:** Ms HAIDER, Huma (Aligarh Muslim University); Prof. ATHAR, M.Sajjad (Aligarh Muslim University)

**Session Classification:** Happy hour with posters

**Track Classification:** Happy hour with posters

Contribution ID: 25

Type: Poster

## Determination of $\sin^2\theta_W$ using $\nu(\bar{\nu})$ -Nucleus scattering

Thursday, 25 October 2012 18:00 (1h 30m)

We shall present the results of our study of non-isoscalarity corrections and nuclear medium effects in the extraction of  $\sin^2\theta_W$  using Paschos-Wolfenstein(PW) relation.

PW relation for an isoscalar nuclear target is defined as

$$\begin{equation} \text{\label{ratio\_cross}} \end{equation}$$

$$R_{\text{PW}} = \frac{\sigma(\nu_{\mu} \rightarrow \nu_{\mu} X) + \sigma(\bar{\nu}_{\mu} \rightarrow \bar{\nu}_{\mu} X)}{\sigma(\nu_{\mu} \rightarrow \mu^{-} X) + \sigma(\bar{\nu}_{\mu} \rightarrow \mu^{+} X)} = \frac{1}{2} \sin^2 \theta_W$$

where  $\sigma(\nu_{\mu}(\bar{\nu}_{\mu}) A \rightarrow \nu_{\mu}(\bar{\nu}_{\mu}) X)$  is the neutral current induced neutrino(antineutrino) cross section,  $\sigma(\nu_{\mu}(\bar{\nu}_{\mu}) A \rightarrow \mu^{-}(\mu^{+}) X)$  is the charged current induced neutrino(antineutrino) cross section

for a  $Z=N$  nuclear target  $A$ , and  $\theta_W$  is the Weinberg angle. The above relation is valid for the total as well as differential cross sections.

The differential cross section is expressed in terms of nuclear structure functions. We have studied nuclear medium effects in the structure functions  $F_2^A(x, Q^2)$  and  $F_3^A(x, Q^2)$  by taking into account Fermi motion, nuclear binding, shadowing and antishadowing corrections and pion and rho meson cloud contribution.

Calculations have been performed in a local density approximations using relativistic nuclear spectral functions which include nucleon correlation.

These structure functions are calculated with target mass correction (TMC) and CTEQ6.6 parton distribution functions (PDFs) at the Leading-Order (LO).

### Summary

NuTeV Collabn. has obtained  $\sin^2\theta_W$  using iron nuclear target and found  $\sin^2\theta_W$  to be  $0.2277 \pm 0.0004$ , which is

3 standard deviations above the global fit of  $\sin^2\theta_W = 0.2227 \pm 0.0004$  and this is known as NuTeV anomaly. PW relation is valid for an isoscalar target while iron is a nonisoscalar target ( $N=30, Z=26$ ), therefore, nonisoscalar corrections are required. Furthermore, nuclear dynamics may also play an important role in the case of neutrino nucleus scattering. Various corrections made by the NuTeV Collaboration has been discussed in literature, but still the reported deviation could not be accounted for.

We shall present the result for  $\sin^2\theta_W$  vs  $y$ , at some values of  $x$  for (anti)neutrino energy of 80 GeV, for an isoscalar target like carbon as well as nonisoscalar nuclear target like iron.

To see the effect of nonisoscalarity in iron target we use a modified PW relation:

$$\begin{equation} \end{equation}$$

$$R_{\text{PW}} = \frac{1}{2} \sin^2 \theta_W + \delta R^{\text{NI}}$$

$$\end{equation}$$

where  $\delta R^{\text{NI}}$  is the correction factor due to nonisoscalarity. We find that there is a nonisoscalarity dependence on the determination of  $\sin^2\theta_W$  in the different regions of  $x$  and  $y$ .

We shall also present the results for  $\sin^2\theta_W$  vs  $y$  due to nuclear medium corrections. We shall discuss these results in detail in the workshop.

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**Co-authors:** Dr RUIZ SIMO, I. (Departamento de Física Atómica Molecular y Nuclear, Universidad de Granada, E-18071 Granada, Spain); Prof. ATHAR, M.Sajjad (Department of Physics, Aligarh Muslim University, India)

**Presenters:** Ms HAIDER, Huma (Department of Physics, Aligarh Muslim University, India); Prof. ATHAR, M.Sajjad (Department of Physics, Aligarh Muslim University, India)

**Session Classification:** Happy hour with posters

**Track Classification:** Happy hour with posters

Contribution ID: 26

Type: **Poster**

## Weak interaction induced $\eta$ -production off the nucleon

*Thursday, 25 October 2012 18:00 (1h 30m)*

$\eta$  production off the nucleon induced by (anti)neutrinos is studied at the low and intermediate energies for the ongoing and future neutrino oscillation experiments. The non-resonant terms are calculated using a microscopical model based on the SU(3) chiral Lagrangians. We consider  $S_{11}(1535)$  and  $S_{11}(1650)$  resonances. The vector part of the N- $S_{11}$  transition form factor has been obtained from the helicity amplitudes using MAID(2007) data, dipole form is taken for the axial form factor and the PCAC relation is used for the pseudoscalar form factor.

### Summary

Most of the neutrino experiments are using (anti)neutrino beam of a few GeV, to which neutrino oscillation parameters are sensitive. In the few GeV energy region the contribution to the cross section comes from the quasielastic, inelastic as well as the deep inelastic processes. Inelastic channel includes, one or multi pion production, kaon production,  $\eta$  production, associated production of particles and so on. It has been realised that the Monte Carlo generators which were being used for predicting the neutrino event rates should be revisited and updated by the new calculations. We shall present the results for the differential and total cross sections for the (anti)neutrino induced  $\eta$ -production off the nucleon.

**Primary author:** Mr RAFI ALAM, M (aligarh muslim university, aligarh, india)

**Co-authors:** Dr ALVAREZ-RUSO, Luis (Instituto de Física Corpuscular (IFIC), Centro Mixto Universidad de Valencia - CSIC, E-46071 Valencia, Spain); Prof. VICENTE VACAS, M J (Instituto de Física Corpuscular (IFIC), Centro Mixto Universidad de Valencia - CSIC, E-46071 Valencia, Spain); Prof. ATHAR, M Sajjad (aligarh muslim university, aligarh, india)

**Presenters:** Dr ALVAREZ-RUSO, Luis (Instituto de Física Corpuscular (IFIC), Centro Mixto Universidad de Valencia - CSIC, E-46071 Valencia, Spain); Mr RAFI ALAM, M (aligarh muslim university, aligarh, india); Prof. ATHAR, M Sajjad (aligarh muslim university, aligarh, india)

**Session Classification:** Happy hour with posters

**Track Classification:** Happy hour with posters



Contribution ID: 27

Type: **Poster**

## RCNP E398 experiment C,O(p,p') to measure $\gamma$ ray branching ratio ( $E > 5 \text{ MeV}$ ) from the giant resonances of carbon and oxygen in relation to the $\gamma$ ray production in C,O( $\nu, \nu'$ ).

Thursday, 25 October 2012 18:00 (1h 30m)

We plan to measure the branching ratios of  $\gamma$ -ray emission ( $E_\gamma > 5 \text{ MeV}$ ) from giant resonance of  $^{16}\text{O}$  and  $^{12}\text{C}$ , as the functions of excitation energy ( $E_x$ ).

This measurement will provide the fundamental and important information not only for the  $\gamma$ -ray production from primary neutral-current neutrino-oxygen ( $\nu$ -carbon) interactions but also for that from the secondary hadronic (neutron-oxygen and  $\nu$ -carbon) interactions.

The understanding of the  $\gamma$ -ray production will introduce a new neutrino detection method to Supernova neutrino physics and Neutrino oscillation physics.

In the second stage, we would like to perform O,C(He,t) ( $T=1$ ) experiment at 0 degrees to continue the systematic study of spin-isospin response through the measurement of the  $\gamma$ -ray production with oxygen and carbon nuclei.

Ref.

[1] T.Mori, M.Sakuda, A.Tamii, H.Toki, M.Nakahata, and K.Ueno, Study of  $\gamma$ -ray production

from neutral-current neutrino-Oxygen interaction and the detection of the neutrino

from Supernova explosion, AIP Conf. Proc.1269, 418-420, 2010.

[2] A.Ankowski,O.Benhar,T.Mori,R.Yamaguchi,and M.Sakuda,

Analysis of  $\gamma$ -ray production in neutral-current neutrino-oxygen quasi-elastic interactions above 200 MeV,

Phys.Rev.Lett.108,052505(2012).

**Primary author:** Mr OU, Iwa (Okayama University)

**Co-authors:** Prof. SAKUDA, Makoto (Okayama University); Mr MORI, Takaaki (Okayama University); Dr YANO, Takatomi (Okayama University)

**Presenter:** Mr OU, Iwa (Okayama University)

**Session Classification:** Happy hour with posters

**Track Classification:** Happy hour with posters

Contribution ID: 28

Type: **Poster**

## Measurements of pion production in eA with the CLAS detector

*Thursday, 25 October 2012 18:00 (1h 30m)*

Preliminary results on semi-inclusive charged pion production in eA collisions at  $E_{\text{beam}}=5 \text{ GeV}/c^2$  are presented. These data are thought to be useful for tuning the hadronic production models used in extracting results from current and next-generation neutrino oscillation experiments.

The data were collected using the CLAS detector, which is a multipurpose, large acceptance, magnetic spectrometer located in Hall B at the Thomas Jefferson National Accelerator Facility. Distributions (integrated and differential) in  $W$ ,  $Q^2$ , pion momentum, and pion angle are shown for data produced using Deuterium, carbon, and iron targets, including radiative corrections. Preliminary comparisons with data simulated using the GENIE generator are made.

### Summary

Preliminary results on semi-inclusive charged pion production in eA on deuterium, carbon, and iron are shown and compared to the MC prediction of GENIE.

**Primary authors:** Mr LEE, Hyupwoo (University of Rochester); Prof. MANLY, Steven (University of Rochester)

**Presenter:** Prof. MANLY, Steven (University of Rochester)

**Session Classification:** Happy hour with posters

**Track Classification:** Happy hour with posters

Contribution ID: 29

Type: **Poster**

## 2p2h effects on the weak pion production cross section

*Thursday, 25 October 2012 18:00 (1h 30m)*

The one pion production process  $\nu A \rightarrow A' l \pi N$  results to be an important background to the quasielastic  $\nu A \rightarrow A' l N$  process used as signal in neutrino oscillation experiments, at the moment of constrain fake events. When only 1p1h final states are considered, the calculated cross section is rough 50% below the experimental data. In this contribution we analyze the effect of adding 2p2h final states.

### Summary

The  $\nu A \rightarrow A' l \pi N$  cross section is calculated including in the elementary amplitude the  $\Lambda(1232 \text{ MeV})$  resonance and nucleon pole, cross and meson exchange nonresonant contributions. Nuclear effects are introduced in the Relativistic Hartree Approximation of QHDI, while pion final state interactions are accounted using the eikonal approach. Both, 1p1h and 2p2h configurations in the final state are considered.

**Primary author:** Prof. MARIANO, Alejandro (Departamento de Física, Universidad Nacional de La plata, Argentina)

**Presenter:** Prof. MARIANO, Alejandro (Departamento de Física, Universidad Nacional de La plata, Argentina)

**Session Classification:** Happy hour with posters

**Track Classification:** Happy hour with posters

Contribution ID: 30

Type: **Poster**

## Toward Construction of the Unified Lepton-Nucleus Interaction Model from a Few Hundred MeV to GeV Region

*Thursday, 25 October 2012 18:00 (1h 30m)*

An accurate understanding of the neutrino nucleus reactions is of great importance owing to the increasing precision of the neutrino oscillation experiments. The purpose of our study is to develop a reaction model for the lepton nucleus reaction from a few hundred MeV to a few GeV. We report on our analysis of the lepton nucleus reaction with the updated resonance model and the nuclear PDF in the DIS region.

**Primary author:** Dr NAKAMURA, Satoshi (Yukawa Institute, Kyoto University)

**Co-authors:** Dr KAMANO, Hiroyuki (RCNP, Osaka University); Prof. SAITO, Koichi (Tokyo University of Science); Prof. SAKUDA, Makoto (Okayama University); Dr HIRAI, Masanori (Tokyo University of Science); Prof. KUMANO, Shunzo (KEK); Prof. SATO, Toru (Osaka University); Prof. HAYATO, Yoshinari (ICRR, Tokyo University)

**Presenter:** Dr NAKAMURA, Satoshi (Yukawa Institute, Kyoto University)

**Session Classification:** Happy hour with posters

**Track Classification:** Happy hour with posters

Contribution ID: 31

Type: **Poster**

## Understanding the NuMI Flux for MINERvA

*Thursday, 25 October 2012 18:00 (1h 30m)*

The Neutrinos at the Main Injector (NuMI) beamline delivers intense neutrino and anti-neutrino beams in an energy range of 2-20 GeV. Understanding these fluxes is crucial for measuring absolute cross sections in MINERvA. Three techniques for constraining these fluxes are being considered in MINERvA: in situ neutrino event rate measurements, external hadron production data and in situ muon flux measurements. This poster will present these three strategies and the status of each one.

**Primary author:** Dr HARRIS, Deborah (Fermilab)

**Presenter:** Dr HARRIS, Deborah (Fermilab)

**Session Classification:** Happy hour with posters

**Track Classification:** Happy hour with posters

Contribution ID: 32

Type: **Poster**

## Study of Quasi-elastic interactions using the NOvA Near Detector Prototype

*Thursday, 25 October 2012 18:00 (1h 30m)*

NOvA is a 14 KTon long-baseline neutrino oscillation experiment currently being installed in the NUMI off-axis neutrino beam produced at Fermilab. A 222 Ton prototype NOvA detector (NDOS) was built and operated in the neutrino beam for over a year to understand the the response of the detector and its construction. Muon neutrino interaction data collected in this test are being analyzed to identify quasi-elastic charge-current interactions and measure the behavior of the Quasi-elastic muon neutrino cross section. The status of these quasi-elastic studies in NDOS will be shown.

**Primary author:** BETANCOURT, Minerba (University of Minnesota)

**Presenter:** BETANCOURT, Minerba (University of Minnesota)

**Session Classification:** Happy hour with posters

**Track Classification:** Happy hour with posters

Contribution ID: 33

Type: **Poster**

## Charged Current Neutral Pion Production at MINERvA

*Thursday, 25 October 2012 18:00 (1h 30m)*

MINERvA is a neutrino experiment located at Fermilab. The main goal of the experiment is to study neutrino interactions using different targets and to measure differential neutrino cross sections. In this poster we concentrate on Charged Current Neutral Pion Production at the MINERvA experiment where the signal is defined as a muon, nucleon and neutral pion in the final state. The reconstructed neutral pion invariant mass and a comparison between data and Monte Carlo is shown.

**Primary author:** Mr MAGGI, Giuliano (Universidad Santa María)

**Presenter:** Mr MAGGI, Giuliano (Universidad Santa María)

**Session Classification:** Happy hour with posters

**Track Classification:** Happy hour with posters

Contribution ID: 34

Type: **Poster**

## MINERvA hadron testbeam results

*Thursday, 25 October 2012 18:00 (1h 30m)*

We exposed a scaled-down version of the MINERvA detector to a beam of pions, kaons, and protons with momenta between 400 and 2000 MeV. These data are important for constraining the detector response to hadrons for our neutrino analyses in many respects: calorimetry, tracking, and PID response, and to constrain detector and Geant4 model uncertainties. For this, we built and operated a new tertiary beamline at the Fermilab Test Beam Facility in Summer 2010, and operated our detector with reconfigurable absorber in a tracker + ECal and ECal + HCal configurations. This poster will include the preliminary results from the analysis of calorimetric response in the ECal + HCal configuration.

**Primary author:** Dr GRAN, Richard (University of Minnesota - Duluth)

**Presenter:** Dr GRAN, Richard (University of Minnesota - Duluth)

**Session Classification:** Happy hour with posters

**Track Classification:** Happy hour with posters



Contribution ID: 36

Type: **Poster**

## MINERvA Neutrino Detector Calibration

*Thursday, 25 October 2012 18:00 (1h 30m)*

Current and future neutrino oscillation experiments depend on precise knowledge of neutrino-nucleus cross-sections. MINERvA is a neutrino scattering experiment at Fermilab, studying the interactions of muon neutrinos and antineutrinos with various nuclear targets. In order to make these measurements, it is vital that we carefully calibrate our detector. This poster explains the various in situ calibration techniques and cross-checks used by MINERvA to convert our electronics output to absolute energy deposition values.

**Primary author:** Ms PATRICK, Cheryl (Northwestern University)

**Presenter:** Ms PATRICK, Cheryl (Northwestern University)

**Session Classification:** Happy hour with posters

**Track Classification:** Happy hour with posters

Contribution ID: 37

Type: **Poster**

## Charged Current Charged Pion and Charged Current Coherent Pion Production

*Thursday, 25 October 2012 18:00 (1h 30m)*

MINERvA (Main Injector Experiment for  $\nu$ -A) is a neutrino scattering experiment in the 1-10 GeV energy range in the NuMI high-intensity neutrino beam at FermiNational Accelerator Laboratory. MINERvA is measuring neutrino/antineutrino scattering off a variety of different nuclear materials (C, Fe, Pb, He, H<sub>2</sub>O). This poster will describe the analysis of Charged Current Charged Pion Production with emphasis on Coherent Pion Production and MINERvA's methods for differentiating signal from background.

**Primary author:** HIGUERA, Aaron (Universidad de Guanajuato)

**Presenter:** HIGUERA, Aaron (Universidad de Guanajuato)

**Session Classification:** Happy hour with posters

**Track Classification:** Happy hour with posters

Contribution ID: 38

Type: **Poster**

## Simulation of atmospheric temperature effects on cosmic ray muon flux

*Thursday, 25 October 2012 18:00 (1h 30m)*

The collision between a cosmic ray and an atmosphere nucleus produces a set of secondary particles, which will decay or interact with other atmosphere elements. This set of events produced by a primary particle is known as an extensive air shower (EAS) and is composed by a muonic, a hadronic and an electromagnetic component. The muonic flux, produced mainly by pion and kaon decays, has a dependency with the atmosphere's effective temperature: an increase in the temperature results in a lower density profile, which decreases the probability of pions and kaons to interact with the atmosphere and, consequently, resulting in a major number of meson decays. Such correlation between the muon flux and the atmosphere's effective temperature was measured by a set of experiments such as AMANDA, Borexino, MACRO and MINOS. This phenomena can be investigated by simulating the final muon flux produced by two different parameterizations of the isothermal atmospheric model in CORSIKA, where each parameterization is described by a depth function which can be related to the muon flux in the same way that the muon flux is related to the temperature. This research checks the agreement among different high energy hadronic interaction models and the physical expected behavior of the atmosphere temperature effect by analysing a set of variables, such as the height of the primary interaction and the difference in the muon flux.

### Summary

The study presented in this poster, which is the result of a Master dissertation, is not directly related to the physics discussed in NuINT, however the student is going to do his PhD on MINOS / MINOS+ experiment which justifies the importance of this workshop for his formation. Nevertheless, to obtain the necessary financial support for the present workshop the student is asked to present a poster.

**Primary authors:** Prof. GOMES, Ricardo (Federal University of Goias - UFG); TOGNINI, Stefano (Federal University of Goias - UFG)

**Presenter:** TOGNINI, Stefano (Federal University of Goias - UFG)

**Session Classification:** Happy hour with posters

**Track Classification:** Happy hour with posters

Contribution ID: 39

Type: **Poster**

## Phenomenological investigation of muon neutrino disappearance via CC interaction

*Thursday, 25 October 2012 18:00 (1h 30m)*

Experimental evidences showed that the time evolution of a particular neutrino flavor state can produce the transition to a different flavor state, a phenomena called neutrino oscillation. In this work we aim to study the oscillation model by doing a phenomenological analysis using the MINOS (Main Injector Neutrino Oscillation Search) published data. We first review the muon neutrino CC disappearance results from SK, K2K and MINOS, then we show some quality tests of the data extracted, including a comparison with the allowed region contour plots. We also show preliminary results of our analysis including 3-flavor oscillation model. This study could contribute to test different sub-dominant models, such as decay and decoherence, trying to improve the oscillation model.

### Summary

The study presented in this poster, which is a preliminary result of a Master dissertation, is not directly related to the physics discussed in NuINT, however the student is going to do his PhD on MINOS / MINOS+ experiment which justifies the importance of this workshop for his formation. Nevertheless, to obtain the necessary financial support for the present workshop the student is asked to present a poster.

**Primary authors:** GOMES, Abner (Federal University of Goias - UFG); Prof. GOMES, Ricardo (Federal University of Goias - UFG)

**Presenter:** GOMES, Abner (Federal University of Goias - UFG)

**Session Classification:** Happy hour with posters

**Track Classification:** Happy hour with posters

Contribution ID: 40

Type: **Poster**

## Measurement of neutrino induced NC-1 $\pi^0$ using the ND280 Tracker region

*Thursday, 25 October 2012 18:00 (1h 30m)*

Single  $\pi^0$  production is one of the most important backgrounds in the  $\nu_\mu \rightarrow \nu_e$  appearance measurement in T2K. Large uncertainties in this production rate make it difficult to predict. Therefore, measurement at the near detector (ND280) is required to constrain efficiently not only the background prediction at the far detector (Super-K) but also at the near detector to improve knowledge of the intrinsic  $\nu_e$  contamination within the beam. We present an analysis based on Monte Carlo simulation of neutral current (NC) single  $\pi^0$  production in the tracker region of ND280. NC-1 $\pi^0$  are selected using a specific two-gamma signature in the tracker. The first gamma from the  $\pi^0$  decay is reconstructed by selecting an  $e^+/e^-$  pair starting in the Fine-Grained target Detector (FGD) and extending into the TPC, where the leptons can be identified and their momentum measured accurately. The second gamma is then selected in time in the calorimeter modules surrounding the tracker. We will present in detail selections cuts, efficiency and purity of the selection. A projection of the expected number of single  $\pi^0$  candidates that are expected for  $3 \times 10^{20}$  POT exposure (run I+II+III data) will be given.

**Primary author:** Dr O'KEEFFE, Helen (University of Oxford)

**Co-authors:** Mr JACOB, Abraham (University of Oxford); Dr WEBER, Alfons (University of Oxford); Dr VACHERET, Antonin (University of Oxford); Dr BARR, Giles (University of Oxford); Mr WILLIAMSON, Zachary (University of Oxford)

**Presenter:** Dr VACHERET, Antonin (University of Oxford)

**Session Classification:** Happy hour with posters

**Track Classification:** Happy hour with posters

Contribution ID: 41

Type: **Poster**

## Present Status of the Neutrino Angra Project

*Thursday, 25 October 2012 18:00 (1h 30m)*

We will present the status of the Neutrino ANGRA project, aimed at developing an antineutrino detector for monitoring nuclear reactor activity. The Angra experiment will be deployed at the Brazilian nuclear power plant Angra II. A water Cherenkov detector of one ton target will be placed in a commercial container next to the reactor containment, about 30 m from the reactor core. The 4 GW thermal power of the Angra II reactor will provide a few thousand antineutrino inverse beta decay interactions per day. The detector will consist of three subsystems: 1) a muon veto placed in the outer most detector layer; 2) a neutron shield 30cm thick consisting of water; 3) a central detector consisting of an inner neutron shield (20cm) and a one ton central target both filled with a mixture of water and 0.2% of gadolinium. The main challenge of the experiment will be to overcome the very high cosmic ray induced background at sea level, consisting of muons, neutrons, gammas, protons, pions, positrons and electrons. We have simulated the signal and background events at the expected rates and used a Mixer program to organize them in temporal order, simulating in this way the real events in the Angra detector. We will present the analysis strategy to overcome the background and extract the number of antineutrino events.

**Primary author:** Mr NASCIMENTO SOUZA, Marcelo Jorge (CBPF)

**Co-author:** NEUTRINO ANGRA, Collaboration (CBPF)

**Presenter:** Mr NASCIMENTO SOUZA, Marcelo Jorge (CBPF)

**Session Classification:** Happy hour with posters

**Track Classification:** Happy hour with posters

Contribution ID: 42

Type: **Poster**

## Systematic muon capture rates in PQRPA

*Thursday, 25 October 2012 18:00 (1h 30m)*

In this work we performed a systematic study of the inclusive muon capture rates for the nuclei  $^{12}\text{C}$ ,  $^{20}\text{Ne}$ ,  $^{32}\text{Mg}$ ,  $^{28}\text{Si}$ ,  $^{40}\text{Ar}$ ,  $^{52}\text{Cr}$ ,  $^{54}\text{Cr}$ ,  $^{56}\text{Fe}$ , and  $^{58}\text{Ni}$  using the Projected Random Quase-particle Phase

Approximation (PQRPA) as nuclear model.

The theoretical results of the capture rates within the PQRPA have been compared with those obtained in other works using other models.

We reckon that the comparison between theory and data for the inclusive muon capture is not a fully satisfactory test on the nuclear model that is used. The exclusive muon transitions are more robust for such a purpose.

### Summary

In this work we performed a systematic study of the inclusive muon capture rates for the nuclei  $^{12}\text{C}$ ,  $^{20}\text{Ne}$ ,  $^{32}\text{Mg}$ ,  $^{28}\text{Si}$ ,  $^{40}\text{Ar}$ ,  $^{52}\text{Cr}$ ,  $^{54}\text{Cr}$ ,  $^{56}\text{Fe}$ , and  $^{58}\text{Ni}$  using the Projected Random Quase-particle Phase Approximation (PQRPA) as nuclear model.

The theoretical formalism for the muon capture rates shown in Ref. [1] is used with the delta interaction as the residual interaction in nuclear structure calculations.

The theoretical results of the capture rates within the PQRPA have been compared with those obtained in other works using the models of RPA+BCS [2] and RQRPA (relativistic QRPA) [3].

This leads to a modification of the axial coupling constant  $g_A = 1$  to  $g_A = 1.135$ , resulting in one better agreement with the experimental data.

The influence of the CVC (Conserved Vector Current) in the muon capture rates for the presented nuclei was explicitly verified for the first time in the literature. This showed to be more significant in lighter nuclei, still more when the Coulomb term of muon-nucleus interaction is disrespected.

A final comparison was carried through inclusive capture and exclusive muon capture rates in  $^{12}\text{C}$  showing that the PQRPA did not present a good experimental agreement for the exclusive capture, only for the inclusive one. We reckon that the comparison between theory and data for the inclusive muon capture is not a fully satisfactory test on the nuclear model that is used.

The exclusive muon transitions are more robust for such a purpose. Therefore, it would be necessary more experimental data for the exclusive capture rates in other nuclei, beyond  $^{12}\text{C}$ , to test if a nuclear model is satisfactory [4].

**References**

- [1] F. Krmpotic, A. Mariano and A. Samana, Phys. Rev. C 71, 044319 (2005).
- [2] N.T. Zinner, K. Langanke e P. Vogel, Phys. Rev. C 74, 024326 (2006).
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**Primary authors:** Dr SAMANA, Arturo (Universidade Estadual de Santa Cruz); Ms SANTOS, Danilo (UFBA); Dr KRMPOTIC, Francisco (UNLP)

**Presenter:** Dr SAMANA, Arturo (Universidade Estadual de Santa Cruz)

**Session Classification:** Happy hour with posters

**Track Classification:** Happy hour with posters



Contribution ID: 45

Type: **Poster**

## CONNIE: Coherent Neutrino-Nucleus Interaction Experiment

*Thursday, 25 October 2012 18:00 (1h 30m)*

This is a new experiment intended to detect very low energy neutrinos coming from a nuclear reactor using CCDs (Charge Coupled Devices). These silicon detectors have very low energy threshold ( $\sim 7\text{eV}$  RMS) and very good spatial resolution ( $\sim 15\mu\text{m}$ ). Also, nowadays, it is possible to fabricate very thick CCDs ( $\sim 250\mu\text{m}$ ) increasing the detecting mass to 1g. All these characteristics make them a perfect candidate for detecting low energy neutrinos by coherent elastic neutrino-nucleus scattering. The experiment is going to be running at Angra Nuclear Power Plant in Brazil since 2013.

**Primary author:** Mr FERNANDEZ MORONI, Guillermo (Fermilab)

**Presenter:** Mr FERNANDEZ MORONI, Guillermo (Fermilab)

**Session Classification:** Happy hour with posters

**Track Classification:** Happy hour with posters

Contribution ID: 46

Type: **Poster**

## Charged Current Quasi-elastic Neutrino Analysis at MINERvA

*Thursday, 25 October 2012 18:00 (1h 30m)*

MINERvA (Main INjector Experiment for  $\nu$ -A) is a neutrino scattering experiment in the NuMI high-intensity neutrino beam at the Fermi National Accelerator Laboratory. MINERvA was designed to make precision measurements of low energy neutrino and antineutrino cross sections on a variety of different materials (plastic scintillator, C, Fe, Pb, He and H<sub>2</sub>O). We present the current status of the charge current quasi-elastic scattering in plastic scintillator.

**Primary author:** Mr FIORENTINI, Guillermo (CBPF)

**Presenter:** Mr FIORENTINI, Guillermo (CBPF)

**Session Classification:** Happy hour with posters

**Track Classification:** Happy hour with posters

Contribution ID: 47

Type: **Poster**

## $\nu_\mu$ CC $\pi^0$ reaction in the Tracker of the ND280 detector in the T2K experiment

*Thursday, 25 October 2012 18:00 (1h 30m)*

Good knowledge of both inclusive and exclusive neutrino interaction cross sections is one of the key issues for a precise determination of the neutrino oscillation parameters in the T2K experiment. These studies are performed at the near detector (ND280). Its central tracker part equipped with a water target serves, among others, to study the  $\nu_\mu$  CC $\pi^0$  reaction. At the energies of the T2K neutrino beam its contribution to the total cross section is relatively large, so the reaction is a potential source of background for the quasi-elastic  $\nu_\mu$  CC reaction. Two different production mechanisms contribute: single pion resonance production and DIS. In addition, FSI has to be considered. Thus, the analysis of the  $\nu_\mu$  CC $\pi^0$  reaction aims also at a better tuning of the MC models used to describe neutrino interactions in T2K.

This poster describes the reconstruction and selection criteria leading to the determination of the exclusive cross section for the  $\nu_\mu$  CC $\pi^0$  reaction.

**Primary author:** Ms BATKIEWICZ, Marcela (Institute of Nuclear Physics Polish Academy of Sciences (IFJ PAN))

**Presenter:** Ms BATKIEWICZ, Marcela (Institute of Nuclear Physics Polish Academy of Sciences (IFJ PAN))

**Session Classification:** Happy hour with posters

**Track Classification:** Happy hour with posters

Contribution ID: 48

Type: **Poster**

## Predictions for hadron polarizations and left-right asymmetry in inclusive reactions involving photons

*Thursday, 25 October 2012 18:00 (1h 30m)*

A phenomenological model which has had some success in explaining polarization phenomena and left-right asymmetry in inclusive proton-proton scattering is considered for reactions involving photons and, hopefully, neutrinos.

In particular, the reactions (a)  $\gamma + p \rightarrow H + X$ , (b)  $\gamma + p(\text{up}) \rightarrow \pi(+/-) + X$ , and (c)  $p(\text{up}) + p \rightarrow \gamma + X$  are considered where  $\gamma$  = resolved photon, and hyperon  $H = \Lambda, \Sigma, \Sigma^*, \dots$ .

Predictions for hyperon polarization in (a) and the asymmetry in (b) and (c) provide further tests of this particular model.

**Primary author:** Dr SOLANO SALINAS, Carlos Javier (UNI, Peru)

**Co-authors:** Dr DA MOTTA, Helio (CBPF); Dr GUPTA, Virendra (CONVESTAV Merida)

**Presenter:** Dr SOLANO SALINAS, Carlos Javier (UNI, Peru)

**Session Classification:** Happy hour with posters

**Track Classification:** Happy hour with posters

Contribution ID: 49

Type: **Poster**

## CHARGED CURRENT INCLUSIVE ANALYSES IN MINERvA

*Thursday, 25 October 2012 18:00 (1h 30m)*

MINERvA is a few-GeV neutrino scattering experiment that has been taking data in the NuMI beam line at Fermilab since November 2009. The experiment will provide important inputs, both in support of neutrino oscillation searches and as a pure weak probe of the nuclear medium. For this, MINERvA employs a fine-grained detector, with an eight ton active target region composed of plastic scintillator and a suite of nuclear targets composed of helium, carbon, iron, lead and water placed upstream of the active region.

In this poster, we present the current status of the charged current inclusive analysis in plastic scintillator as well as in the nuclear targets.

**Primary author:** Mr MARTINEZ, David (Centro Brasileiro de Pesquisas Fisicas)

**Presenter:** Mr MARTINEZ, David (Centro Brasileiro de Pesquisas Fisicas)

**Session Classification:** Happy hour with posters

**Track Classification:** Happy hour with posters

Contribution ID: 50

Type: **not specified**

## **MiniBoone/SciBoone**

*Monday, 22 October 2012 09:30 (25 minutes)*

**Primary author:** Dr KATORI, Teppei (Massachusetts Institute of Technology)

**Presenter:** Dr KATORI, Teppei (Massachusetts Institute of Technology)

**Session Classification:** Current and future experiments

Contribution ID: 51

Type: **not specified**

## MINERvA

*Monday, 22 October 2012 09:55 (25 minutes)*

**Primary author:** Mr FIORENTINI, Guillermo (CBPF)

**Presenter:** Mr FIORENTINI, Guillermo (CBPF)

**Session Classification:** Current and future experiments

Contribution ID: 52

Type: **not specified**

## Argoneut

*Monday, 22 October 2012 10:45 (25 minutes)*

**Primary author:** Dr SZELC, Andrzej (Yale University)

**Presenter:** Dr SZELC, Andrzej (Yale University)

**Session Classification:** Current and future experiments



Contribution ID: 53

Type: **not specified**

## T2K

*Monday, 22 October 2012 11:10 (25 minutes)*

**Primary author:** Mr SCULLY, Daniel (University of Warwick)

**Presenter:** Mr SCULLY, Daniel (University of Warwick)

**Session Classification:** Current and future experiments

Contribution ID: 54

Type: **not specified**

## **MINOS/NOVA**

*Monday, 22 October 2012 11:35 (30 minutes)*

**Presenter:** Dr NOWAK, Jaroslaw (University of Minnesota)

**Session Classification:** Current and future experiments

Contribution ID: 55

Type: **not specified**

## **Comparison of MC codes (introduction)**

*Monday, 22 October 2012 14:00 (45 minutes)*

**Primary author:** Mr DYTMAN, Steven (Univ. of Pittsburgh)

**Presenter:** Mr DYTMAN, Steven (Univ. of Pittsburgh)

**Session Classification:** Confronting theory and experiments

Contribution ID: 56

Type: **not specified**

## **Comparison of MC codes (results)**

*Monday, 22 October 2012 14:45 (45 minutes)*

**Primary author:** Mr GOLAN, Tomasz (Wroclaw University)

**Presenters:** Dr MAYER, Nathan (Tufts University); Mr GOLAN, Tomasz (Wroclaw University)

**Session Classification:** Confronting theory and experiments

**Track Classification:** Summary of NuInt11 and goals of NuInt12

Contribution ID: 57

Type: **not specified**

## **Comparison of MC and theoretical models to recent pion production data**

*Monday, 22 October 2012 16:00 (30 minutes)*

**Primary author:** Dr RODRIGUES, Philip (University of Rochester)

**Presenter:** Dr RODRIGUES, Philip (University of Rochester)

**Session Classification:** Confronting theory and experiments

Contribution ID: 58

Type: **not specified**

## **MC implementation of MEC models**

*Monday, 22 October 2012 16:30 (30 minutes)*

**Primary author:** Dr KATORI, Teppei (Massachusetts Institute of Technology)

**Presenter:** Dr KATORI, Teppei (Massachusetts Institute of Technology)

**Session Classification:** Confronting theory and experiments

Contribution ID: **60**

Type: **not specified**

## **MiniBooNE CC inclusive latest results**

*Monday, 22 October 2012 17:00 (20 minutes)*

**Presenter:** Prof. TZANOV, Martin (Louisiana State University)

**Session Classification:** Deep and shallow inelastic scattering, quark hadron duality

Contribution ID: **61**

Type: **not specified**

## **MINERvA CC inclusive latest results**

*Monday, 22 October 2012 17:20 (20 minutes)*

**Primary author:** Mr HURTADO ANAMPA, Kenyi Paolo (CBPF)

**Presenter:** Mr HURTADO ANAMPA, Kenyi Paolo (CBPF)

**Session Classification:** Deep and shallow inelastic scattering, quark hadron duality



Contribution ID: **62**

Type: **not specified**

## **T2K CC inclusive latest results**

*Monday, 22 October 2012 17:40 (20 minutes)*

**Primary author:** Dr WEBER, Alfons (University of Oxford & STFC/RAL)

**Presenter:** Dr WEBER, Alfons (University of Oxford & STFC/RAL)

**Session Classification:** Deep and shallow inelastic scattering, quark hadron duality

Contribution ID: 63

Type: **not specified**

## **Recent experimental developments on coherent neutrino-nucleus interactions and related aspects**

**Primary author:** Mr FERNANDEZ MORONI, Guillermo (Fermilab)

**Presenter:** Mr FERNANDEZ MORONI, Guillermo (Fermilab)

Contribution ID: **64**

Type: **not specified**

## **Systematic in J-PARC/Hyper-K**

*Wednesday, 24 October 2012 09:20 (25 minutes)*

**Presenter:** Dr MINAMINO, Akihiro (Kyoto University)

**Session Classification:** Systematics

Contribution ID: 65

Type: **not specified**

## **Systematic in LBNO (EU)**

*Wednesday, 24 October 2012 09:45 (25 minutes)*

**Presenter:** Dr WEBER, Alfons (University of Oxford & STFC/RAL)

**Session Classification:** Systematis

Contribution ID: **66**

Type: **not specified**

## **Anti-neutrino to neutrino cross section systematics**

*Wednesday, 24 October 2012 10:10 (25 minutes)*

**Presenter:** Dr ANKOWSKI, Artur (INFN and Department of Physics, "Sapienza" Universita' di Roma)

**Session Classification:** Systematics

Contribution ID: 67

Type: **not specified**

## **Systematics at a Neutrino Factory**

*Wednesday, 24 October 2012 11:00 (25 minutes)*

**Presenter:** WINTER, Walter (Wuerzburg)

**Session Classification:** Systematics

Contribution ID: **68**

Type: **not specified**

## **Nue cross-sections at the recently proposed nuSTORM experiment at Fermilab**

*Wednesday, 24 October 2012 11:25 (25 minutes)*

**Presenter:** MORFIN, Jorge G. (Fermilab)

**Session Classification:** Systematis

Contribution ID: 69

Type: **not specified**

## **Impact of systematic uncertainties for the CP violation measurement in superbeam experiments,**

*Wednesday, 24 October 2012 11:50 (25 minutes)*

**Primary author:** Dr MELONI, davide (RomaTre University)

**Presenter:** Dr MELONI, davide (RomaTre University)

**Session Classification:** Systematis



Contribution ID: 70

Type: **not specified**

## Discussion

*Wednesday, 24 October 2012 12:15 (15 minutes)*

**Session Classification:** Systematis

Contribution ID: 71

Type: **not specified**

## **Weak pion production off nuclei**

*Thursday, 25 October 2012 09:00 (30 minutes)*

**Primary author:** Dr HERNÁNDEZ-GAJATE, Eliecer (Universidad de Salamanca)

**Presenter:** Dr HERNÁNDEZ-GAJATE, Eliecer (Universidad de Salamanca)

**Session Classification:** Pion production and other inelastic processes

Contribution ID: 72

Type: **not specified**

## **Neutrino-induced forward meson production reactions in nucleon resonance region**

*Thursday, 25 October 2012 09:30 (30 minutes)*

**Primary author:** Dr NAKAMURA, Satoshi (Yukawa Institute, Kyoto University)

**Presenter:** Dr NAKAMURA, Satoshi (Yukawa Institute, Kyoto University)

**Session Classification:** Pion production and other inelastic processes

Contribution ID: 73

Type: **not specified**

## Strange particle production from nucleons and nuclei

*Thursday, 25 October 2012 10:00 (30 minutes)*

**Primary author:** Dr ATHAR, MOHAMMAD SAJJAD (DEPARTMENT OF PHYSICS, ALIGARH MUSLIM UNIVERSITY, ALIGARH)

**Presenter:** Dr ATHAR, MOHAMMAD SAJJAD (DEPARTMENT OF PHYSICS, ALIGARH MUSLIM UNIVERSITY, ALIGARH)

**Session Classification:** Pion production and other inelastic processes

Contribution ID: 74

Type: **not specified**

## Charged pion production results from MINERnA

*Thursday, 25 October 2012 11:00 (20 minutes)*

**Primary author:** Mr EBERLY, Brandon (University of Pittsburgh)

**Presenter:** Mr EBERLY, Brandon (University of Pittsburgh)

**Session Classification:** Pion production and other inelastic processes

Contribution ID: 75

Type: **not specified**

## Charged pion production results from T2K

*Thursday, 25 October 2012 11:20 (20 minutes)*

**Presenter:** Mr MATTHEW, Murdoch (University of Liverpool)

**Session Classification:** Pion production and other inelastic processes

Contribution ID: 76

Type: **not specified**

## **Comparisons of theoretical calculations with MiniBooNE pion production data**

*Thursday, 25 October 2012 11:40 (25 minutes)*

**Primary author:** Dr LALAKULICH, Olga (Universitaet Giessen)

**Presenter:** Dr LALAKULICH, Olga (Universitaet Giessen)

**Session Classification:** Pion production and other inelastic processes

Contribution ID: 77

Type: **not specified**

## Discussion

*Thursday, 25 October 2012 12:05 (25 minutes)*

**Session Classification:** Pion production and other inelastic processes



Contribution ID: 78

Type: **not specified**

## **Photon emission in (anti)neutrino neutral current interactions with nucleons and nuclei**

*Thursday, 25 October 2012 14:00 (30 minutes)*

**Primary author:** Dr ALVAREZ-RUSO, Luis (University of Valencia)

**Presenter:** Dr ALVAREZ-RUSO, Luis (University of Valencia)

**Session Classification:** Pion production and other inelastic processes

Contribution ID: 79

Type: **not specified**

## Neutral pion results from T2K

*Thursday, 25 October 2012 14:30 (20 minutes)*

**Presenter:** Dr VACHERET, Antonin (University of Oxford)

**Session Classification:** Pion production and other inelastic processes

Contribution ID: **80**

Type: **not specified**

## **Coherent and neutral pion production results from MINERnA**

*Thursday, 25 October 2012 14:50 (20 minutes)*

**Primary authors:** HIGUERA, Aaron (Universidad de Guanajuato); Mr PALOMINO GALLO, Jose Luis (CBPF)

**Presenter:** Mr PALOMINO GALLO, Jose Luis (CBPF)

**Session Classification:** Pion production and other inelastic processes

Contribution ID: **81**

Type: **not specified**

## Discussion

*Thursday, 25 October 2012 15:10 (20 minutes)*

**Session Classification:** Pion production and other inelastic processes

Contribution ID: **82**

Type: **not specified**

## **CC and quasi-elastic introduction**

*Thursday, 25 October 2012 16:00 (25 minutes)*

**Presenter:** MAHN, Kendall (TRIUMF)

**Session Classification:** CC and NC quasi-elastic scattering

Contribution ID: 83

Type: **not specified**

## **MiniBooNE anti-nu quasi-elastic and neutral current elastic analysis**

*Thursday, 25 October 2012 16:25 (35 minutes)*

**Primary author:** GRANGE, Joe (University of Florida)

**Presenter:** GRANGE, Joe (University of Florida)

**Session Classification:** CC and NC quasi-elastic scattering

Contribution ID: **84**

Type: **not specified**

## **CCQE results from MINERnA**

*Thursday, 25 October 2012 17:00 (30 minutes)*

**Primary author:** Dr FIELDS, Laura (Northwestern University)

**Presenter:** Dr FIELDS, Laura (Northwestern University)

**Session Classification:** CC and NC quasi-elastic scattering

Contribution ID: 85

Type: **not specified**

## **The T2K CCQE selection and prospects for CC, QE, NC cross section measurements**

*Thursday, 25 October 2012 17:30 (30 minutes)*

**Primary author:** Mr RUTERBORIES, Daniel (Colorado State University)

**Presenter:** Mr RUTERBORIES, Daniel (Colorado State University)

**Session Classification:** CC and NC quasi-elastic scattering



Contribution ID: **86**

Type: **not specified**

## **Exclusive CCQE topologies in ArgoNeuT**

*Friday, 26 October 2012 09:00 (25 minutes)*

**Primary author:** Ms PARTYKA, Kinga (Yale University)

**Presenter:** Ms PARTYKA, Kinga (Yale University)

**Session Classification:** CC and NC quasi-elastic scattering

Contribution ID: 87

Type: **not specified**

## **Consistent analysis of NC and CC neutrino scattering off carbon**

*Friday, 26 October 2012 09:25 (20 minutes)*

**Primary author:** Dr ANKOWSKI, Artur (INFN and Department of Physics, "Sapienza" Università di Roma)

**Presenter:** Dr ANKOWSKI, Artur (INFN and Department of Physics, "Sapienza" Università di Roma)

**Session Classification:** CC and NC quasi-elastic scattering

Contribution ID: **88**

Type: **not specified**

## **QE scattering in the Relativistic Green Function approach**

*Friday, 26 October 2012 09:45 (20 minutes)*

**Primary author:** Mr MEUCCI, Andrea (Universita' di Pavia)

**Presenter:** Mr MEUCCI, Andrea (Universita' di Pavia)

**Session Classification:** CC and NC quasi-elastic scattering

Contribution ID: **89**

Type: **not specified**

## **CCQE, 2p2h excitations and nu energy reconstruction**

*Friday, 26 October 2012 10:05 (25 minutes)*

**Primary author:** Dr NIEVES, Juan (IFIC (CSIC-UV))

**Presenter:** Dr NIEVES, Juan (IFIC (CSIC-UV))

**Session Classification:** CC and NC quasi-elastic scattering

Contribution ID: **90**

Type: **not specified**

## **Inelastic scattering in eA and the measurement of R**

*Friday, 26 October 2012 11:00 (30 minutes)*

**Presenter:** Prof. CHRISTY, Eric (Hampton University)

**Session Classification:** Electron scattering and meson exchange currents

Contribution ID: **91**

Type: **not specified**

## **QE scattering in eA and scaling from nuclei**

*Friday, 26 October 2012 11:30 (30 minutes)*

**Presenter:** Dr DAY, Donal Day (University of Virginia)

**Session Classification:** Electron scattering and meson exchange currents

Contribution ID: 92

Type: **not specified**

## **Superscaling in electro-nucleus scattering and its link to NC and CC QE neutrino-nucleus scattering**

*Friday, 26 October 2012 12:00 (30 minutes)*

**Primary author:** Prof. BARBARO, Maria Benedetta (University of Turin, Italy)

**Presenter:** Prof. BARBARO, Maria Benedetta (University of Turin, Italy)

**Session Classification:** Electron scattering and meson exchange currents

Contribution ID: 93

Type: **not specified**

# Discussion



Contribution ID: 94

Type: **not specified**

## **Two body electroweak currents and inclusive electron and neutrino scattering**

*Friday, 26 October 2012 14:00 (30 minutes)*

**Primary author:** Prof. SCHIAVILLA, Rocco (Jefferson Lab/Old Dominion University)

**Presenter:** Prof. SCHIAVILLA, Rocco (Jefferson Lab/Old Dominion University)

**Session Classification:** Electron scattering and meson exchange currents

Contribution ID: 95

Type: **not specified**

## **Hints on nuclear effects from ArgoNeut,**

*Friday, 26 October 2012 14:30 (30 minutes)*

**Primary author:** Dr PALAMARA, Ornella (Yale University)

**Presenter:** Dr PALAMARA, Ornella (Yale University)

**Session Classification:** Electron scattering and meson exchange currents

Contribution ID: **96**

Type: **not specified**

## **Discussion**

*Friday, 26 October 2012 15:00 (30 minutes)*

**Session Classification:** Electron scattering and meson exchange currents

Contribution ID: 97

Type: **not specified**

## **Flux issues in Xsec - measurements**

*Friday, 26 October 2012 16:00 (25 minutes)*

**Primary author:** Dr HARTZ, Mark (University of Toronto/York University)

**Presenter:** Dr HARTZ, Mark (University of Toronto/York University)

**Session Classification:** Current and future experiments

Contribution ID: **98**

Type: **not specified**

## **Progress on Liquid argon technologies**

*Friday, 26 October 2012 16:25 (25 minutes)*

**Primary author:** KARAGIORGI, Georgia (Columbia University)

**Presenter:** KARAGIORGI, Georgia (Columbia University)

**Session Classification:** Current and future experiments

Contribution ID: 99

Type: **not specified**

## NuSTORM

*Friday, 26 October 2012 16:50 (25 minutes)*

**Primary author:** Prof. BROSS, Alan (Fermilab)

**Presenter:** Prof. BROSS, Alan (Fermilab)

**Session Classification:** Current and future experiments

Contribution ID: **100**

Type: **not specified**

## **Future Water experiments**

*Friday, 26 October 2012 17:15 (25 minutes)*

**Primary author:** Dr BERGEVIN, Marc (UC Davis)

**Presenter:** Dr BERGEVIN, Marc (UC Davis)

**Session Classification:** Current and future experiments

Contribution ID: **101**

Type: **not specified**

## Discussion

*Friday, 26 October 2012 17:40 (20 minutes)*

**Session Classification:** Current and future experiments



Contribution ID: **102**

Type: **not specified**

## **Electron Scattering Discussion**

*Saturday, 27 October 2012 09:40 (20 minutes)*

**Presenter:** Dr NIEVES, Juan (IFIC (CSIC-UV))

**Session Classification:** Path forward and future prospects

Contribution ID: **103**

Type: **not specified**

## **NC and CC QE Scattering Discussion**

*Saturday, 27 October 2012 10:00 (20 minutes)*

**Presenter:** Dr ALVAREZ-RUSO, Luis (University of Valencia)

**Session Classification:** Path forward and future prospects

Contribution ID: **104**

Type: **not specified**

## **Pion Production Discussion**

*Saturday, 27 October 2012 10:20 (20 minutes)*

**Primary author:** Mr DYTMAN, Steven (Univ. of Pittsburgh)

**Presenter:** Mr DYTMAN, Steven (Univ. of Pittsburgh)

**Session Classification:** Path forward and future prospects

Contribution ID: **105**

Type: **not specified**

## **Confronting theory and experiment Discussion**

*Saturday, 27 October 2012 10:40 (20 minutes)*

**Primary authors:** Prof. GALLAGHER, Hugh (Tufts University); SOBCZYK, Jan (Wroclaw University/Fermilab); Dr HAYATO, Yoshinari (Kamioka, ICRR, Univ. of Tokyo)

**Presenter:** SOBCZYK, Jan (Wroclaw University/Fermilab)

**Session Classification:** Path forward and future prospects

Contribution ID: **106**

Type: **not specified**

## **Shallow to DIS Discussion**

*Saturday, 27 October 2012 11:00 (20 minutes)*

**Primary author:** Dr RAY, Heather (University of Florida)

**Presenter:** Dr RAY, Heather (University of Florida)

**Session Classification:** Path forward and future prospects

Contribution ID: **107**

Type: **not specified**

## **Very Low Energy Neutrino Discussion**

*Saturday, 27 October 2012 11:50 (20 minutes)*

**Presenter:** Prof. SUZUKI, Toshio (Nihon University)

**Session Classification:** Path forward and future prospects

Contribution ID: **108**

Type: **not specified**

## **Systematic Effects Discussion**

*Saturday, 27 October 2012 12:10 (20 minutes)*

**Presenter:** Dr NUNOKAWA, Hiroshi (Department of Physics, Pontificia Universidade Catolica do Rio de Janeiro)

**Session Classification:** Path forward and future prospects

Contribution ID: **109**

Type: **not specified**

## **The Path Forward, An Experimentalist's Perspective**

*Saturday, 27 October 2012 12:30 (30 minutes)*

**Presenter:** Prof. MCFARLAND, Kevin (University of Rochester)

**Session Classification:** Path forward and future prospects



Contribution ID: **110**

Type: **not specified**

## **The Path Forward, A Theorist's Perspective**

*Saturday, 27 October 2012 13:00 (30 minutes)*

**Presenter:** Dr ALVAREZ-RUSO, Luis (University of Valencia)

**Session Classification:** Path forward and future prospects

Contribution ID: **111**

Type: **not specified**

## **Discussion**

*Saturday, 27 October 2012 09:00 (40 minutes)*

**Session Classification:** Path forward and future prospects

Contribution ID: 112

Type: **not specified**

## **BoNuS latest results and updates**

*Tuesday, 23 October 2012 09:00 (25 minutes)*

**Presenter:** Prof. CHRISTY, Eric (Hampton University)

**Session Classification:** Deep and shallow inelastic scattering, quark hadron duality

Contribution ID: 113

Type: **not specified**

## **DIS collider experiment results**

*Tuesday, 23 October 2012 09:25 (25 minutes)*

**Primary author:** Dr RIZVI, Eram (Queen Mary, University of London)

**Presenter:** Dr RIZVI, Eram (Queen Mary, University of London)

**Session Classification:** Deep and shallow inelastic scattering, quark hadron duality

Contribution ID: 114

Type: **not specified**

## CTEQ latest results and updates

*Tuesday, 23 October 2012 09:50 (25 minutes)*

**Presenter:** MORFIN, Jorge G. (Fermilab)

**Session Classification:** Deep and shallow inelastic scattering, quark hadron duality

Contribution ID: 115

Type: **not specified**

## GiBUU latest results and updates

*Tuesday, 23 October 2012 10:40 (20 minutes)*

**Primary author:** Dr LALAKULICH, Olga (Universitaet Giessen)

**Presenter:** Dr LALAKULICH, Olga (Universitaet Giessen)

**Session Classification:** Deep and shallow inelastic scattering, quark hadron duality

Contribution ID: **116**

Type: **not specified**

## **SIS latest results and updates**

*Tuesday, 23 October 2012 11:00 (20 minutes)*

**Presenter:** Dr LALAKULICH, Olga (Universitaet Giessen)

**Session Classification:** Deep and shallow inelastic scattering, quark hadron duality

Contribution ID: **117**

Type: **not specified**

## Discussion

*Tuesday, 23 October 2012 11:20 (45 minutes)*

**Session Classification:** Deep and shallow inelastic scattering, quark hadron duality



Contribution ID: **118**

Type: **not specified**

## **Recent experimental developments on coherent neutrino-nucleus interactions and related aspects**

*Wednesday, 24 October 2012 09:00 (20 minutes)*

**Presenter:** Mr FERNANDEZ MORONI, Guillermo (Fermilab)

**Session Classification:** Very low neutrino interactions

Contribution ID: 119

Type: **not specified**

## **Neutrino nucleosynthesis process in core-collapsed supernovae and neutrino oscillations**

*Tuesday, 23 October 2012 13:30 (30 minutes)*

**Presenter:** Prof. KAJINO, Taka (National Astronomical Observatory, University of Tokyo)

**Session Classification:** Very low neutrino interactions

Contribution ID: 120

Type: **not specified**

## **Beta-beam neutrinos and neutrino-nucleus interactions**

*Tuesday, 23 October 2012 14:00 (30 minutes)*

**Primary author:** Dr JACHOWICZ, Natalie (Ghent University)

**Presenter:** Dr JACHOWICZ, Natalie (Ghent University)

**Session Classification:** Very low neutrino interactions

Contribution ID: 121

Type: **not specified**

## **Neutrino-nucleus reactions based on recent structure studies**

*Tuesday, 23 October 2012 14:30 (30 minutes)*

**Primary author:** Prof. SUZUKI, Toshio (Nihon University)

**Presenter:** Prof. SUZUKI, Toshio (Nihon University)

**Session Classification:** Very low neutrino interactions

Contribution ID: 122

Type: **not specified**

## **Neutrino oscillations and nucleosynthesis in supernovae and GRB**

*Tuesday, 23 October 2012 15:00 (30 minutes)*

**Primary author:** MALKUS, Annelise (North Carolina State University)

**Presenter:** MALKUS, Annelise (North Carolina State University)

**Session Classification:** Very low neutrino interactions

Contribution ID: 123

Type: **not specified**

## **Helium and lead observatory od supernovae neutrinos**

*Tuesday, 23 October 2012 16:00 (30 minutes)*

**Presenter:** Prof. VIRTUE, Clarence (Laurentian University)

**Session Classification:** Very low neutrino interactions

Contribution ID: 124

Type: **not specified**

## **Possibilities for direct nu-Argon cross section measurements in the low energy region**

*Tuesday, 23 October 2012 16:30 (30 minutes)*

**Primary author:** Prof. CAVANNA, Flavio (Yale U.)

**Presenter:** Prof. CAVANNA, Flavio (Yale U.)

**Session Classification:** Very low neutrino interactions

Contribution ID: 125

Type: **not specified**

## Coherent elastic neutrino scattering

*Tuesday, 23 October 2012 17:00 (30 minutes)*

**Presenter:** Dr JONGHEE, Yoo (Fermi National Accelerator Laboratory)

**Session Classification:** Very low neutrino interactions



Contribution ID: 126

Type: **not specified**

## Discussion

*Tuesday, 23 October 2012 17:30 (30 minutes)*

**Session Classification:** Very low neutrino interactions

Contribution ID: 127

Type: **not specified**

## Overview talk on MC generators

*Monday, 22 October 2012 13:30 (30 minutes)*

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

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

**Session Classification:** Confronting theory and experiments

Contribution ID: 128

Type: **Poster**

## How much does MSW contributes to the reactor neutrino anomaly?

*Thursday, 25 October 2012 18:00 (1h 30m)*

Reactor neutrino experiments have observed a 5% deficit of electron anti-neutrino flux, when compared to the one predicted from nuclear physics as a product of the reactor's fission chains. One aspect that might have been overlooked in the literature is the contribution from extreme non-adiabatic effects coming from "decompression" when leaving the high density nuclear fuel rods. This work explores a analytic solution for this effect and presents its contribution to the reactor neutrino deficit.

**Primary author:** Prof. VALDIVIESSO, Gustavo (Universidade Federal de Alfenas)

**Presenter:** Prof. VALDIVIESSO, Gustavo (Universidade Federal de Alfenas)

**Session Classification:** Happy hour with posters

**Track Classification:** Happy hour with posters

Contribution ID: 129

Type: **Poster**

## Measurement of the muon background at the Angra Neutrino laboratory

*Thursday, 25 October 2012 18:00 (1h 30m)*

The Angra II nuclear reactor, which has the 4 GW of thermal power, is located in the Angra dos Reis nuclear power plant in the State of Rio de Janeiro in Brazil. The large fission rate of  $10^{20}$  per second produce about 5000 antineutrino interactions per day in a detector with only  $1 \text{ m}^3$  at the distance of 30 m from the reactor core. As the flux of antineutrinos is proportional to the thermal power delivered by the reactor, by measuring the interaction rate of antineutrinos in the detector, we expect to be able to monitor the thermal power generated by the reactor in quasi-real time as well as the time evolution of the composition of the nuclear fuel. However, in order to observe antineutrinos coming from the reactor, we have to veto muons, one of the most important background components. Moreover, energetic muons can produce neutrons through the process of spallation that can mimic the neutrons generated by the neutrino interaction, increasing the background. In this work we have performed the measurement of the muon flux at sea level as these data are very important to estimate the background level in the antineutrino detector.

**Primary authors:** Mr ANJOS, João (CBPF); Mrs ABRAHÃO, Thamys (PUC-Rio/CBPF)

**Presenter:** Mrs ABRAHÃO, Thamys (PUC-Rio/CBPF)

**Session Classification:** Happy hour with posters

**Track Classification:** Happy hour with posters

Contribution ID: **130**

Type: **not specified**

## Final remarks

*Saturday, 27 October 2012 13:30 (20 minutes)*

**Presenter:** MORFIN, Jorge G. (Fermilab)

**Session Classification:** Closing