NUINT 12

RIO DE JANEIRO BRAZIL

OCTOBER 22-27

REVISITED


FAPERJ
Fundação Carlos Chagas Filho de Amparo
à Pesquisa do Estado do Rio de Janeiro


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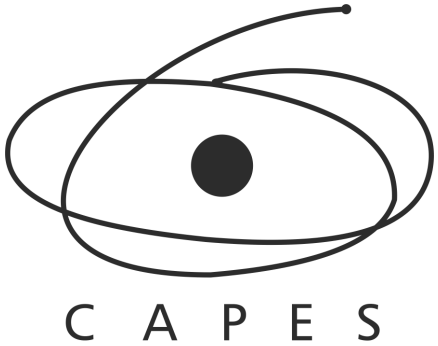
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NUINT12 SESSIONS AND CONVENERS

Current and future experiments	Steven Boyd (Warwick, UK) Masashi Yokoyama (Tokyo, Japan) Bonnie Fleming (Yale, USA) Morgan Wascko (Imperial College London, UK)
Confronting theory and experiments	Jan Sobczyk (Wroclaw, Poland) Yoshinari Hayato (Kamioka obs. Tokyo, Japan) Renata Zukanovich (USP, Brazil) Hugh Gallagher (Tufts, USA)
Deep and shallow inelastic scattering, quark hadron duality	Shunzo Kumano (KEK, Japan) Heather Ray (USA) Alberto Gago (PUC-Lima, Peru)
Very low neutrino interactions	Flavio Cavanna (L'Aquila,Italy) Toshio Suzuki (Nihon, Japan) Kate Scholberg (Duke, USA)
Systematics effects on CP violation measurements	Tsuyoshi Nakaya (Kyoto, Japan) Hiroshi Nunokawa (PUC-Rio, Brazil) Mary Bishai (FNAL, USA) Paul Soler (Glasgow, UK)
Pion production and other inelastic processes	Michel Sorel (Valencia, Spain) Shri Singh (Srinagar, India) Steve Dytman (Pittsburgh, USA)
CC and NC quasi-elastic scattering	Kendall Mahn (Triumf, Canada) Luis Alvarez Ruso (Valencia, Spain) Laura Fields (Northwestern, USA)
Electron scattering and meson exchange currents	Juan Nieves (Valencia, Spain) Steve Manly (Rochester, USA) Toru Sato (Osaka, Japan)
Path forward and future prospects	Ulrich Mosel (Giessen, Germany) Geralyn Zeller (FERMILAB, USA) Xavier Bertou (CNEA/CONICET, Argentina)
Posters	Makoto Sakuda (Okayama, Japan) Mike Kordosky (William and Mary, USA)

8th in a series that started in 2001

NUINT01 – Tsukuba – Japan
NUINT02 – UC Irvice – USA
NUINT04 – Gran Sasso – Italy
NUINT05 – Okayama – Japan
NUINT07 – Fermilab – USA
NUINT09 – Barcelona – Spain
NUINT11 – Dehradun – India
NUINT12 – Rio de Janeiro – Brazil

98 participants (27 students)
63 presentations
21 posters

9 sessions

98 participants

NUINT12 LIVE IN THE INTERNET

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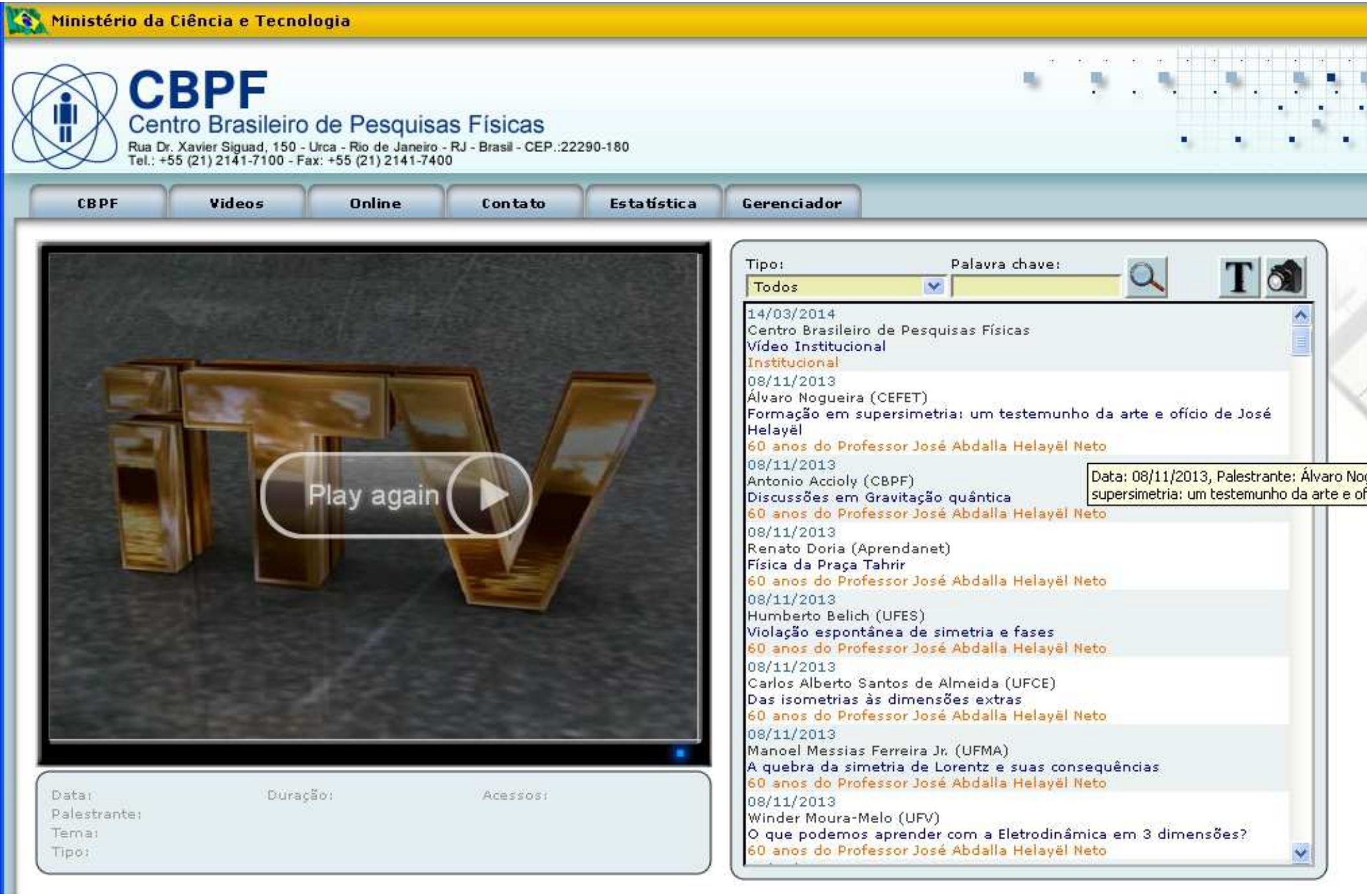

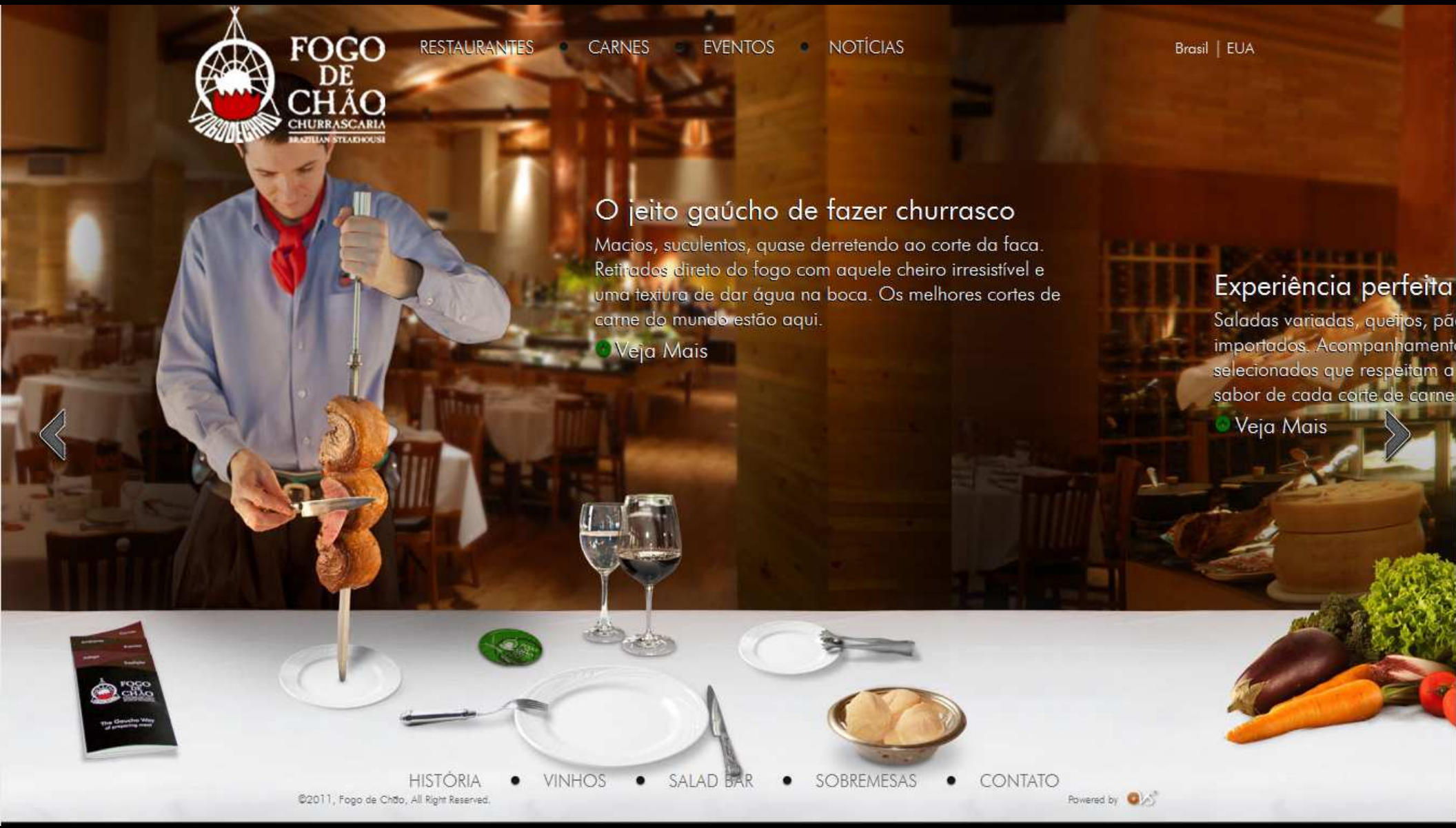
FOGO DE CHÃO
CHURRASCARIA
BRAZILIAN STEAKHOUSE
RESTAURANTES • CARNES • EVENTOS • NOTÍCIAS
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O jeito gaúcho de fazer churrasco
Macios, suculentos, quase derretendo ao corte da faca. Retirados direto do fogo com aquele cheiro irresistível e uma textura de dar água na boca. Os melhores cortes de carne do mundo estão aqui.
Veja Mais
Experiência perfeita
Saladas variadas, queijos, pã
importados. Acompanhament
selecionados que respeitam a
sabor de cada corte de carne
Veja Mais
HISTÓRIA • VINHOS • SALAD BAR • SOBREMESAS • CONTATO
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Current and future experiments

(9 speakers)

We had description and review of

MiniBooNE

SciBooNE

MINERvA

T2K

ArgoNeut

MINOS

NovA

NuSTORM

Water experiments

Liquid argon technologies

Confronting theory and experiments

(5 speakers)

Discussions of the accuracy of models for neutrino-nucleus simulations have been present since NUINT01. Increasing precision of neutrino oscillation experiments will require, over time, increasing precision in our ability to simulate neutrino-nucleus scattering processes.

Tension between "having the right physics" versus "describing the data". Generator developers strive to achieve BOTH aims

Generators comparisons are interesting but new aproaches may be needed like making comparisons between generators and basic data used for tuning and work the way up through a variety of data for tuning and validation.

Model improvement: Priority at multi-nucleon scattering processes

DIS and SIS

(8 speakers)

Focus on three primary areas: recent experimental results; fits to the global body of data; latest theory predictions.

CC-inclusive results from MiniBooNE, MINERvA, and T2K.

The extracted cross sections and ratios of cross sections agree within a few sigma with the predictions from the NUANCE, NEUT, and GENIE generators.

Preliminary results from BoNuS

Latest results from the CTEQ.

Of great interest was the handling of the transition region between SIS and DIS interactions.

We saw how the various neutrino generators (NEUT, NUANCE, GENIE, and GiBUU)agree/disagree in their predictions

Very low-energy neutrino interactions

(8 speakers)

Three questions were addressed in this section

(1) how important are ν-processes in nucleosynthesis?

(2) how ν-oscillations affect the nucleosynthsis?
(3) how accurately do we know ν-nucleus cross sections?

Experimental ν -induced reaction cross sections for ^{12}C and ^{56}Fe at DAR energies can be well reproduced by SM (SM+RPA) calculations with the use of new SM Hamiltonians. The GT strengths in ^{56}Ni and ^{40}Ar are also well described by SM calculations.

We hope that we get a decisive determination of the neutrino mass hierarchy from long base-line accelerator experiments in near future.

Systematics effects on CP violation measurements

(6 speakers)

J-PARK – Hyper-K LBL experiments have potential to reveal full picture of neutrino oscillation.

Systematic uncertainties are important for study of sub-leading CPV effect

Cross section uncertainties increase in the low Q2 region due to multinucleo processes

Neutrino Factory is the only experiment that can measure the CP phase with CKM-like precision.

There is a need to actually measure ν_e cross sections to minimize the systematic error. NuSTORM could provide an intense beam of well-known flux (order of 1%) of ne (and anti-ne)for ne and anti-ne cross section measurement in a single experiment.

Pion production

(9 speakers)

Two themes were common to many talks: problems with data for single nucleons and pion absorption in the nuclear medium.

Single nucleon cross section: no experiment yet to measure single nucleon pion production cross section (only low statistcs buble chamber experiment data available)

Pion atenuation in the nuclear medium: theoretical calculation differ from data both in shape and magnitude. Need for new data

CC and NC quasi-elastic scattering

(8 speakers)

Experimental results

MINERvA:first differential antineutrico cross section
MiniBooNE: CC and NC differential cross section
ArgoNEUT: progress on QE analysis on Ar target.

Theoretical results

Eν ~ 100 GeV, ~90% of CCQE cross section comes from

Relativistic Green's function approach provides a consistent treatment of FSI in inclusive and exclusive scattering

State of the art model (Pauli blocking, RPA/SRC Delta and MEC) agrees with MiniBooNE electron scattering data better than FG with M_A = 1.08 GeV

Electron scattering and MEC

(5 speakers)

Discussions:

Can we replace the RFG model for a better one?

EMC is driven by local nuclear density. Do we need to include local clustering in our models?

Is it important that neutrino event generators be validated on eA?

To what Q^2 can we trust superscaling?

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MAIN TOPICS

Electron scattering and Meson Exchange Currents

CC and NC quasi-elastic scattering

Pion production and other inelastic processes

Deep and shallow inelastic scattering, quark hadron duality

Systematic effects on CP violation measurements

Confronting theory and experiments, event simulators

Very low energy neutrino interactions

Future experiments

Path forward and future prospects

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Masashi Yokoyama (Tokyo, Japan)
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Michel Sorel (Valencia, Spain)
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Paul Soler (Glasgow, UK)
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Steve Dytman (Pittsburgh, USA)
Steven Boyd (Warwick, UK)
Toru Sato (Osaka, Japan)
Toshio Suzuki (Nihon, Japan)
Tsuyoshi Nakaya (Kyoto, Japan)
Ulrich Mosel (Giessen, Germany)
William Brooks (USM, Chile)
William Louis (LANL, USA)
Xavier Bertou (CARP, Argentina)
Yoshinari Hayato (Kamioka obs., Japan)

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MONDAY OCTOBER 22

08:30 – 08:45	**Registration**	
08:45 – 09:30	**Opening**	
Current and future experiments I		
09:30 – 09:55	MiniBooNE/SciBooNE	Teppei Katori (MIT)
09:55 – 10:20	The MINERνA detector	Guillermo Fiorentini (CBPF)
10:20 – 10:45	**Coffee break**	
10:45 – 11:10	Argoneut	Andrzej Szelc (Yale)
11:10 – 11:35	T2K	Daniel Scully (Warwick)
11:35 – 12:05	MINOS/NOvA	Jarek Nowak (Minesota)
12:05 – 13:30	**Lunch**	
Confronting theory and experiments		
13:30 – 14:00	Overview talk on MC generators	Yoshinari Hayato (Kamioka)
14:00 – 14:45	Comparison of MC codes (introduction)	Steve Dytman (Pittisbutgh)
14:45 – 15:30	Comparison of MC codes (results)	Tomasz Golan (Wroclaw) and Nathan Mayer (Tufts)
15:30 – 16:00	**Coffee break**	
16:00 – 16:30	Comparison of MC and theoretical models to recent pion production data	Phil Rodrigues (Rochester)
16:30 – 17:00	MC implementation of MEC models	Teppei Katori (MIT)
Deep and shallow inelastic scattering, quark hadron duality		
17:00 – 17:20	MiniBooNE CC inclusive latest results	Martin Tzanov (Louisiana)
17:20 – 17:40	MINERνA CC inclusive latest results	Kenyi Hurtado (CBPF)
17:40 – 18:00	T2K CC inclusive latest results	Alfons Weber (Oxford)
18:00 – 20:00	**Welcome cocktail**	

TUESDAY OCTOBER 23

Deep and shallow inelastic scattering, quark hadron duality		
09:00 – 09:25	BoNuS latest results and updates	Eric Christy (Hampton)
09:25 – 09:50	DIS collider experiment results	Eram Rizvi (Queen Mary of London)
09:50 – 10:15	CTEQ latest results and updates	Jorge Morfín (Fermilab)
10:15 – 10:40	**Coffee break**	
10:40 – 11:00	GiBUU latest results and updates	Ulrich Mosel (Giessen)
11:00 – 11:20	SIS latest results and updates	Olga Lalakulich (Giessen)
11:20 – 12:05	Discussion	
12:05 – 13:30	**Lunch**	
Very low neutrino interactions		
13:30 – 14:00	Neutrino nucleosynthesis process in core-collapsed supernovae and neutrino oscillations	Toshitaka Kajino (NAO Tokyo)
14:00 – 14:30	Beta-beam neutrinos and neutrino-nucleus interactions	Natalie Jachowicz (Ghent)
14:30 – 15:00	Neutrino-nucleus reactions based on recent structure studies	Toshio Suzuki (Nihon)
15:00 – 15:30	Neutrino oscillations and nucleosynthesis in supernovae amd GRB	Annelise Malkus (North Carolina State)
15:30 – 16:00	**Coffee break**	
16:00 – 16:30	Helium and lead observatory od supernovae neutrinos	Clarence Virtue (Laurentian)
16:30 – 17:00	Possibilities for direct nu-Argon cross section measurements in the low energy region	Flavio Cavanna (Yale)
17:00 – 17:30	Coherent elastic neutrino scattering	Yoo Jonghee (Fermilab)
17:30 – 18:00	Discussion	

WEDNESDAY OCTOBER 24

Very low neutrino interactions		
09:00 – 09:20	Recent experimental developments on coherent neutrino-nucleus interactions and related aspects	Fernando Moroni (Fermilab)
Systematic effects on CP violation measurements		
09:20 – 09:45	Systematic in J-PARC/Hyper-K	Akihiro Minamino (Kyoto)
09:45 – 10:10	Systematic in LBNO (EU)	Alfons Weber (Oxford)
10:10 – 10:35	Anti-neutrino to neutrino cross section systematics	Artur Ankowski (Sapienza)
10:35 – 11:00	**Coffe break**	
11:00 – 11:25	Systematics at a Neutrino Factory	Walter Winter (Wurzburg)
11:25 – 11:50	Nue cross-sections at the recently proposed nuSTORM experiment at Fermilab	Jorge Morfín (Fermilab)
11:50 – 12:15	Impact of systematic uncertainties for the CP violation measurement in superbeam experiments,	Davide Meloni (RomaTre)
12:15 – 12:30	Discussion	
12:30 – 14:00	**Lunch**	
Tour		

THURSDAY OCTOBER 25

Pion production and other inelastic processes		
09:00 – 09:30	Weak pion production off nuclei	Eliecer. Hernández-Gajate (Salamanca)
09:30 – 10:00	Neutrino-induced forward meson production reactions in nucleon resonance region	Satoshi Nakamura (Kyoto)
10:00 – 10:30	Strange particle production from nucleons and nuclei	Mohammad Sajjad Athar (Aligarh)
10:30 – 11:00	**Coffe break**	
11:00 – 11:20	Charged pion production results from MINERνA	Brandon Eberly (Pittsburgh)
11:20 – 11:40	Charged pion production results from T2K	Murdoch Matthew (Liverpool)
11:40 – 12:05	Comparisons of theoretical calculations with MiniBooNE pion production data	Olga Lalakulich (Giessen)
12:05: – 12:30	Discussion	
12:30 – 14:00	**Lunch**	
14:00 – 14:30	Photon emission in (anti)neutrino neutral current interactions with nucleons and nuclei	Luis Alvarez Ruso (Valencia)
14:30 – 14:50	Neutral pion results from T2K	Antonin Vacheret (Oxford)
14:50 – 15:10	Coherent and neutral pion production results from MINERνA	Jose Palomino (CBPF)
1510 – 15:30	Discussion	
15:30 – 16:00	**Coffee break**	
CC and NC quasi-elastic scattering		
16:00 – 16:25	CC and quasi-elastic introduction	Kendall Mahn (TRIUMF)
16:25 – 17:00	MiniBooNE anti-nu quasi-elastic and neutral current elastic analysis	Joe Grange (Florida)
17:00 – 17:30	CCQE results from MINERνA	Laura Fields (Northwestern)
17:30 – 18:00	The T2K CCQE selection and prospects for CC, QE, NC cross section measurements	Daniel Ruterbories (Colorado State)
18:00 – 19:30	Happy hour with posters	
20:00 – 22:00	**Workshop dinner**	

POSTER SESSION

Title	Presenter
A-dependence of weak nuclear structure functions	Haider, Huma (Aligarh)
Determination of $\sin^2(\theta_w)$ using $\nu\,\bar{\nu}$ -Nucleus scattering	Haider, Huma (Aligarh)
Weak interaction induced η-production off the nucleon	Rafi Alam, M (Aligarh)
RCNP E398 experiment C,O(p,p') to measure γ ray branching ratio (E>5MeV) from the giant resonances of carbon and oxygen in relation to the γ ray production in C,O(ν,ν').	Ou, Iwa (Okayama)
Measurements of pion production in eA with the CLAS detector	Manly, Steven (Rochester)
2p2h effects on the weak pion production cross section	Mariano, Alejandro (La Plata)
Toward Construction of the Unified Lepton-Nucleus Interaction Model from a Few Hundred MeV to GeV Region	Nakamura, Satoshi (Kyoto)
Understanding the NuMI Flux for MINERνA	Harris, Deborah (Fermilab)
Study of Quasi-elastic interactions using the NOvA Near Detector Prototype	Betancourt, Minerba (Minesota)
Charged Current Neutral Pion Production at MINERνA	Maggi, Giuliano (Santa Maria)
MINERνA hadron testbeam results	Gran, Richard (Minesota)
Coherent Pion Production at T2K	Scully, Daniel (Warwick)
Charged Current Charged Pion and Charged Current Coherent Pion Production	Higuera, Aaron (Guanajuato)
Simulation of atmospheric temperature effects on cosmic ray muon flux	Tognini, Stefano (Goiás)
Phenomenological investigation of muon neutrino disappearance via CC interaction	Gomes, Abner (Goiás)
Measurement of neutrino induced NC-1$\neq^0$ using the ND280 Tracker region	Vacheret, Antonin (Oxford)
Present Status of the Neutrino Angra Project	Nascimento Souza, Marcelo Jorge (CBPF)
Systematic muon capture rates in PQRPA	Samana, Arturo (Santa Cruz)
CONNIE: Coherent Neutrino-Nucleus Interaction Experiment	Fernandez Moroni, Guillermo (Fermilab)
Charged Current Quasi-elastic Neutrino Analysis at MINERνA	Fiorentini, Guillermo (CBPF)
$\nu\mu$ CCπ^0 reaction in the Tracker of the ND280 detector in the T2K experiment	Batkiewicz, Marcela (IFJ PAN)
Predictions for hadron polarizations and left-right asymetry in inclusive reactions involving photons	Solano Salinas, Carlos Javier (UNI)
Charged current inclusive analysis in MINERνA	Martinez, David (CBPF)
How much does MSW contributes to the reactor neutrino anomaly?	Valdiviesso, Gustavo (Alfenas)

SATURDAY OCTOBER 27

Path forward and future prospects		
09:00 – 09:20	Electron Scattering Discussion	
09:20 – 09:40	NC and CC QE Scattering Discussion	
09:40 – 10:00	Pion Production Discussion	
10:00 – 10:20	Event Simulator Discussion	
10:20 – 10:40	Shallow to DIS Discussion	
10:40 – 11:10	Coffee break	
11:10 – 11:30	Very Low Energy Neutrino Discussion	
11:30 – 11:50	Systematic Effects Discussion	
11:50 – 12:20	The Path Forward, An Experimentalist's Perspective	Kevin McFarland (Rochester)
12:20 – 12:50	The Path Forward, A Theorist's Perspective	Luis Alvarez-Ruso (Valencia)
12:50 – 13:30	Discussion	
Closing		