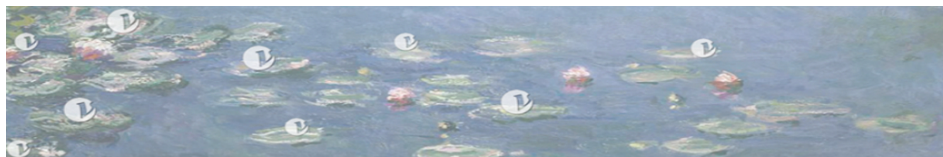# Invisibles 14 School

Rapport sur les contributions

ID de Contribution: **0**   Type: **Non spécifié**

Basics of neutrino physics (1/2)

mardi 8 juillet 2014 09:00 (1 heure)

Orateur: ZUKANOVICH FUNCHAL, Renata (Université de São Paulo/CEA Saclay)

ID de Contribution: **1**   Type: **Non spécifié**

Statistical tools (1/2)

mardi 8 juillet 2014 15:00 (1 heure)

Orateur: COWAN, Glen

ID de Contribution: **2**   Type: **Non spécifié**

Effective theories (1/3)

mardi 8 juillet 2014 11:30 (1 heure)

Orateur: GEORGI, Howard

ID de Contribution: **4**   Type: **Non spécifié**

Basics of neutrino physics (2/2)

mardi 8 juillet 2014 17:30 (1 heure)

Orateur: ZUKANOVICH FUNCHAL, Renata (Université de São Paulo/CEA Saclay)

ID de Contribution: **5** Type: **Non spécifié**

Dark matter and cosmology (1/2)

mardi 8 juillet 2014 10:00 (1 heure)

Orateur: SILK, Joe (IAP)

ID de Contribution: **6**   Type: **Non spécifié**

Neutrino theory (BSM and phenomenological implications) (1/3)

mercredi 9 juillet 2014 09:00 (1 heure)

Orateur: FERUGLIO, Ferruccio

ID de Contribution: **7**   Type: **Non spécifié**

Effective theories (2/3)

mercredi 9 juillet 2014 10:00 (1 heure)

Orateur: GEORGI, Howard

ID de Contribution: **8**   Type: **Non spécifié**

Neutrino data analysis (1/2)

vendredi 11 juillet 2014 16:30 (1 heure)

Orateur: SCHWETZ, Thomas

ID de Contribution: **9**   Type: **Non spécifié**

Dark matter and cosmology (2/2)

mercredi 9 juillet 2014 11:30 (1 heure)

Orateur: SILK, Joseph

ID de Contribution: **10**   Type: **Non spécifié**

Neutrino experiments (1/4)

mercredi 9 juillet 2014 16:30 (1 heure)

Orateur: HARRIS, Debbie

ID de Contribution: **11**   Type: **Non spécifié**

Neutrino data analysis (2/2)

samedi 12 juillet 2014 09:00 (1 heure)

Orateur: SCHWETZ, Thomas

ID de Contribution: **12**   Type: **Non spécifié**

Effective theories (3/3)

jeudi 10 juillet 2014 11:00 (1 heure)

Orateur: GEORGI, Howard

ID de Contribution: **13**　　　　　　　　　　　　　　　　Type: **Non spécifié**

Neutrino theory (BSM and phenomenological implications) (2/3)

jeudi 10 juillet 2014 09:30 (1 heure)

Orateur:　FERUGLIO, Ferruccio

ID de Contribution: **14**   Type: **Non spécifié**

Neutrino theory (BSM and phenomenological implications) (3/3)

vendredi 11 juillet 2014 09:00 (1 heure)

Orateur: FERUGLIO, Ferruccio

ID de Contribution: **15**   Type: **Non spécifié**

Neutrinos in cosmology (1/2)

vendredi 11 juillet 2014 10:00 (1 heure)

Orateur: LESGOURGUES, Julien

ID de Contribution: **16**   Type: **Non spécifié**

Neutrino experiments (2/4)

jeudi 10 juillet 2014 08:30 (1 heure)

Orateur: HARRIS, Debbie

ID de Contribution: **17**   Type: **Non spécifié**

Neutrino experiments (4/4)

vendredi 11 juillet 2014 14:00 (1 heure)

Orateur: HARRIS, Debbie

ID de Contribution: **18**   Type: **Non spécifié**

LHC physics (1/2)

vendredi 11 juillet 2014 17:30 (1 heure)

Orateur: PEREZ, Gilad

ID de Contribution: **19**

Type: **Non spécifié**

Neutrino experiments (3/4)

vendredi 11 juillet 2014 11:30 (1 heure)

Orateur: HARRIS, Debbie

ID de Contribution: **20**   Type: **Non spécifié**

Neutrinos in cosmology (2/2)

samedi 12 juillet 2014 10:00 (1 heure)

Orateur: LESGOURGUES, Julien

ID de Contribution: **21** Type: **Non spécifié**

LHC physics (2/2)

samedi 12 juillet 2014 11:30 (1 heure)

Orateur: PEREZ, Gilad

ID de Contribution: **22**   Type: **Non spécifié**

New geometrical approaches to amplitudes

samedi 12 juillet 2014 16:30 (1 heure)

Orateur: PARKE, Stephen

ID de Contribution: **24**   Type: **Non spécifié**

Statistical tools (2/2)

mardi 8 juillet 2014 16:30 (1 heure)

Orateur: COWAN, Glen

ID de Contribution: **34** Type: **Non spécifié**

CP violating phase from charged-lepton mixing

mercredi 9 juillet 2014 18:00 (1 heure)

A model independent analysis of the leptonic Dirac CP-violating phase ({\delta}) is presented. The analysis uses the experimentally determined values of the mixing angles in the lepton mixing matrix in order to explore the allowed values for {\delta} and possible general forms for the charged lepton mixing matrix. This is done under two general assumptions: 1) that the mixing matrix in the neutrino sector is the so-called tribimaximal matrix and hence the non zero value for {\theta}13 arises due to the mixing matrix in the charged lepton sector and 2) the charged lepton mixing matrix is parametrized in terms of three angles and one phase. It is found that any value of {\delta} is still consistent with the data and that, considering the assumptions above, regardless of the value for {\delta}, the 1-3 mixing angle in the charged lepton sector is small but non zero and the 2-3 mixing angle can take values in only two possible small ranges around 0 and {\pi}/2 respectively.

Based on work done with J. Alberto Acosta, Alfredo Aranda, Julio Virrueta

Orateur: ACOSTA LOPEZ, Jesus Alberto

Classification de Session: Poster session

ID de Contribution: **35**   Type: **Non spécifié**

Predicting the neutrino CP phase with charged lepton corrections

mercredi 9 juillet 2014 18:00 (1 heure)

After the successful determination of the reactor neutrino mixing angle \mbox{$\theta_{13} \cong 0.16 \neq 0$}, a new feature suggested by the current neutrino oscillation data is a sizeable deviation of the atmospheric neutrino mixing angle θ_{23} from $\pi/4$. Using the fact that the neutrino mixing matrix $U = U_e^\dagger U_\nu$, where U_e and U_ν result from the diagonalisation of the charged lepton and neutrino mass matrices, and assuming that U_ν has a i) bimaximal (BM), ii) tri- bimaximal (TBM) form, or else iii) corresponds to the conservation of the lepton charge $L' = L_e$-L_μ-L_τ (LC), we investigate quantitatively what are the minimal forms of U_e, in terms of angles and phases it contains, that can provide the requisite corrections to U_ν so that θ_{13}, θ_{23} and the solar neutrino mixing angle θ_{12} have values compatible with the current data. Two possible orderings of the 12 and the 23 rotations in U_e, standard" and inverse", are considered. The results we obtain depend strongly on the type of ordering. In the case of "standard" ordering, in particular, the Dirac CP violation phase δ, present in U, is predicted to have a value in a narrow interval around i) $\delta \cong \pi$ in the BM (or LC) case, ii) $\delta \cong 3\pi/2$ or $\pi/2$ in the TBM case, the CP conserving values $\delta = 0, \pi, 2\pi$ being excluded in the TBM case at more than 4σ.

Based on work done with David Marzocca, S. T. Petcov, Andrea Romanino, M. C. Sevilla
JHEP 05(2013) 073 [arXiv:1302.0423]

Orateurs: MARZOCCA, David; CERDA SEVILLA, Maria

Classification de Session: Poster session

ID de Contribution: 36   Type: **Non spécifié**

An SU(5)xS4xU(1) supersymmetric model of flavor

mercredi 9 juillet 2014 18:00 (1 heure)

This work aims to explain the masses and mixings of the fermionic content in the Standard Model and its supersymmetric extention, using a Family symmetry, in an SU(5)xS_4xU(1) GUT model. Results icorporate the GST and GS relations for quark and lepton masses and predict Tribimaximal mixing in the neutrino sector, corrected by a higher order operator. The goal is to predict flavvour changing processes, relevant for lepton flavour violation and B-physics experiments.

Based on work done with M. Dimou, S. F. King, C. Luhn, C. Hagedorn

Orateur: DIMOU, Maria

Classification de Session: Poster session

ID de Contribution: **37**
Type: **Non spécifié**

Generalised geometrical CP violation in a T' lepton flavour model

mercredi 9 juillet 2014 18:00 (1 heure)

We analyse the interplay of generalised CP transformations and the non-Abelian discrete group T′ and use the semi-direct product Gf=T′⋊HCP, as family symmetry acting in the lepton sector. The family symmetry is shown to be spontaneously broken in a geometrical manner. In the resulting flavour model, naturally small Majorana neutrino masses for the light active neutrinos are obtained through the type I see-saw mechanism. The known masses of the charged leptons, lepton mixing angles and the two neutrino mass squared differences are reproduced by the model with a good accuracy. The model allows for two neutrino mass spectra with normal ordering (NO) and one with inverted ordering (IO). For each of the three spectra the absolute scale of neutrino masses is predicted with relatively small uncertainty. The value of the Dirac CP violation (CPV) phase δ in the lepton mixing matrix is predicted to be $\delta \simeq \pi/2$ or $3\pi/2$. Thus, the CP violating effects in neutrino oscillations are predicted to be maximal (given the values of the neutrino mixing angles) and experimentally observable. We present also predictions for the sum of the neutrino masses, for the Majorana CPV phases and for the effective Majorana mass in neutrinoless double beta decay. The predictions of the model can be tested in a variety of ongoing and future planned neutrino experiments.

Based on work done with I. Girardi, A. Meroni, S. T. Petcov and M. Spinrath

JHEP 1402 (2014) 050 [arXiv:1312.1966 [hep-ph]]

Orateur: GIRARDI, Ivan

Classification de Session: Poster session

ID de Contribution: **38**   Type: **Non spécifié**

Atmospheric muon-induced background study for the Double Chooz experiment

mercredi 9 juillet 2014 18:00 (1 heure)

Atmospheric muons represent an important background for neutrino oscillation experiments such as Double Chooz. They can cross the detector, depositing a great amount of energy, or decay after a few centimeters, depositing just enough energy to be miscounted as a neutrino interaction, or even trigger in the surrounding rock a shower of fast neutrons that can interact in the detector, mimicking a neutrino signal. Although solutions exist to veto out crossing muons with a near 4π coverage, the geometry of Double Chooz detectors allow some muons to decay into the active detection volume. I will present a study aiming to reduce this background based on the likelihood of the event reconstruction algorithm. I will also present DCTPC, a neutron TPC developed to provide a directional measurement of the fast neutron flux in Double Chooz detector halls. This measurement will allow us to further constrain Double Chooz's model of fast neutron background.

Based on work done with Adrien Hourlier, Jaime Dawson

Orateur: HOURLIER, Adrien

Classification de Session: Poster session

ID de Contribution: **39**   Type: **Non spécifié**

Probing large extra dimensions with IceCube

mercredi 9 juillet 2014 18:00 (1 heure)

We study the highest energy sample of atmospheric neutrinos in the IceCube neutrino observatory to study for the first time the phenomenology of the matter effects of Large Extra Dimension Models. The oscillation probability in matter were computed for the LED model an distinct series of dips appear in anti- muon survival probability. We show that an effective 3+3*N model, which N is the number of sterile states that can effectively reproduce and explain these dips. From the absence of the observed oscillation in the high energy data of IceCube we can constrain the radius of the large extra dimension $R\_ED < 6 \times 10^{-5}$ cm and $m^D\_1 < 2.7$ eV for IceCube-40 data and $R\_ED < 3.5 \times 10^{-5}$ cm and $m^D\_1 < 4.0$ eV for IceCube-79 data.

Based on work done with Arman Esmaili,O. L. G. Peres, and Zahra Tabrizi

Orateur: KHAJEH TABRIZI, Zahra

Classification de Session: Poster session

ID de Contribution: **40**   Type: **Non spécifié**

On the renormalization of the electroweak chiral Lagrangian

mercredi 9 juillet 2014 18:00 (1 heure)

We deal here with the off-shell renormalization of the chiral effective Lagrangian for physics beyond the Standard Model, based on a non-linear realization of the $SU(2)_L \times U(1)_Y$ gauge symmetry breaking in the presence of a light Higgs particle, up to four derivatives. We consider the full would-be Goldstone bosons and Higgs sector of the Lagrangian. All one loop amplitudes are computed using dimensional regularization. Apparent chiral noninvariant divergences are encountered in the process. Nevertheless, they are non-physical. We provide a method for the renormalization of these amplitudes off- shell, which involves a redefinition of the would-be Goldstone boson fields that includes space-time derivatives and the Higgs field.

Based on work done with Belen Gavela, Kirill Kanshin, Pedro Machado, Sara Saa, Stefano Rigolin

Orateurs: MACHADO, Pedro; SAA ESPINA, Sara

Classification de Session: Poster session