

XLVII International Meeting on Fundamental Physics

Report of Contributions

Contribution ID: 2

Type: **not specified**

Time reversal violating NN interactions (V. Gudkov)

Wednesday, 5 June 2019 12:45 (30 minutes)

(25'+5')

The detailed structure of parity violating (P-odd) and time reversal invariance violating (TRIV) nucleon-nucleon interactions is discussed. We consider three possible interactions: P-violating, TRIV and P-odd, and TRIV and P-even ones, using both a meson exchange formalism, and EFT formalism, and their possible manifestations in different experiments including neutron and atomic EDMs, and nuclear reactions. The comparison of these interactions show some possible advantages of the search for TRI violation in neutron nuclei interactions.

Primary author: GUDKOV, Vladimir (University of South Carolina)

Presenter: GUDKOV, Vladimir (University of South Carolina)

Session Classification: T violation

Contribution ID: 3

Type: **not specified**

Are we overlooking Lepton Flavour Universal New Physics in $b \rightarrow s\ell\ell$? (P. Masjuan)

Thursday, 6 June 2019 09:00 (30 minutes)

(25'+5')

The deviations with respect to the Standard Model that are currently observed in flavour anomalies can be interpreted in terms of different New Physics (NP) scenarios within a model-independent effective approach. We examine the roles played by LFUV NP and Lepton-Flavour Universal (LFU) NP altogether, providing new directions to identify the possible theory beyond the SM responsible for the anomalies observed. New patterns of NP emerge due to the possibility of allowing at the same time large LFUV and LFU NP contributions to

$C10\mu$, which provides a different mechanism to obey the constraint from the $B_s \rightarrow \mu^+\mu^-$ branching ratio. In this landscape of NP, we discuss how to discriminate among these scenarios in the short term thanks to current and forthcoming observables.

Primary author: MASJUAN, Pere (IFAE, UAB)

Presenter: MASJUAN, Pere (IFAE, UAB)

Session Classification: Flavour

Contribution ID: 4

Type: **not specified**

Stability of string cosmology near space-time singularities

Wednesday, 5 June 2019 13:15 (15 minutes)

Using the method of asymptotic splittings we provide a detailed analysis of the early- and late-time asymptotics of a wide range of possible homogeneous string cosmologies. These contain moduli, axion as well as shifted dilaton fields. A complete portrait of all possible asymptotic solutions in regions where some of the fields blow up is given, and the early- and late-time dynamics of spatially flat FRW solutions is explained and compared to those known in standard relativistic cosmology. Our results provide a novel picture concerning the stability of the dilaton-moduli-vacuum and the dilaton-vacuum solutions of string cosmology near cosmological singularities.

Primary authors: Dr KOLIONIS, Georgios (American University of the Middle East, College of Engineering); Prof. COTSAKIS, Spiros (University of the Aegean)

Presenter: Dr KOLIONIS, Georgios (American University of the Middle East, College of Engineering)

Session Classification: String cosmology

Contribution ID: 5

Type: **not specified**

Spanish strategy (M.J. Borge, J. Cuevas & C. Lacasta)

Friday, 7 June 2019 13:15 (45 minutes)

Presenters: LACASTA, Carlos (IFIC-Valencia); CUEVAS, F. Javier (Universidad de Oviedo); GARCÍA BORGE, María José (CSIC)

Session Classification: Scientific strategy

Contribution ID: 7

Type: **not specified**

EU strategy (J. d'Hondt)

Friday, 7 June 2019 12:30 (45 minutes)

(40'+5')

Presenter: D'HONDT, Jorgen (Vrije Universiteit Brussel)

Session Classification: Scientific strategy

Contribution ID: 15

Type: **not specified**

Course: gamma ray astronomy and multimessengers (D. Nieto)

Thursday, 6 June 2019 17:30 (1 hour)

(55'+5')

Presenter: NIETO CASTAÑO, Daniel (Universidad Complutense de Madrid - IPARCOS)

Session Classification: Special courses

Contribution ID: 16

Type: **not specified**

Course: gamma ray astronomy and multimessengers (D. Nieto)

Thursday, 6 June 2019 15:00 (1 hour)

(55'+5')

Presenter: NIETO CASTAÑO, Daniel (Universidad Complutense de Madrid - IPARCOS)

Session Classification: Special courses

Contribution ID: 17

Type: **not specified**

LHC: EFT in Vector Boson Scattering (R. Gómez Ambrosio for VBSan COST)

Friday, 7 June 2019 09:00 (45 minutes)

(40'+5')

Presenter: GÓMEZ AMBROSIO, Raquel (Durham University)

Session Classification: LHC

Contribution ID: 19

Type: **not specified**

Course: the extraordinary case of light scalar mesons (J.R. Peláez)

Wednesday, 5 June 2019 12:00 (45 minutes)

(40'+5')

Presenter: PELÁEZ, José R. (Universidad Complutense de Madrid)

Session Classification: Special courses

Contribution ID: 23

Type: **not specified**

Course: dark matter (David Cerdeño)

Wednesday, 5 June 2019 11:00 (1 hour)

Presenter: CERDEÑO, David (IPPP, Durham University)

Session Classification: Special courses

Contribution ID: 25

Type: **not specified**

Breaking of CPT due to quantum decoherence tested at DUNE (F.N. Díaz Desposorio)

(25'+5')

In this work we study the intrinsic CPT violation in the neutrino oscillations phenomena produced by quantum decoherence as sub-leading effect. In the usual representation, we find that only fifteen elements of the decoherence matrix violate the CPT symmetry intrinsically. We find exact solutions for the CPT asymmetry function in vacuum. We define an observable \mathcal{R} to make predictions of this model for the future Long-Baseline experiment, DUNE. We found values of the decoherence parameters with 5σ of discrepancy to standard physics which are allowed by the current experimental limits suggesting hints for new physics by this model in the context of future experiments.

<https://doi.org/10.1103/PhysRevD.99.075022>

Primary authors: DÍAZ DESPOSORIO, Félix Napoleón (Pontificia Universidad Católica del Perú); CAR-RASCO, Juan C.; Dr GAGO MEDINA, Alberto

Presenter: DÍAZ DESPOSORIO, Félix Napoleón (Pontificia Universidad Católica del Perú)

Session Classification: Neutrinos

Contribution ID: 26

Type: **not specified**

Perspectives for Vector Boson Scattering in the Fully Hadronic Channel

Monday, 3 June 2019 18:45 (30 minutes)

(25'+5')

Primary author: Dr DELGADO LÓPEZ, Rafael (TUM)

Presenter: Dr DELGADO LÓPEZ, Rafael (TUM)

Session Classification: LHC

Contribution ID: 27

Type: **not specified**

Determining the strong running coupling at Z_0 -mass from lattice QCD with physical quark masses (F. de Soto Borreo)

Tuesday, 4 June 2019 17:45 (30 minutes)

(25'+5')

The non-renormalization of the ghost-gluon vertex offers a precise recipe to determine the running of α_s from gluon and ghost propagators in lattice-QCD (in the Taylor renormalization scheme). A non-perturbative analysis of this running allows obtaining $\Lambda_{\overline{\text{MS}}}$ which determines the value of the coupling at the Z_0 -pole mass, $\alpha_{\overline{\text{MS}}}(m_Z^2)$.

In this work, we exploit lattice QCD configurations using Domain-Wall fermions at the physical pion mass to compute $\alpha_T(q^2)$. Besides the relevance of this parameter in many computations for hadron collider physics (Its current uncertainty of about 1% renders it the least precisely known of all fundamental coupling constants in nature), the Taylor-scheme strong coupling has been revealed of great interest by itself because it can be directly related to the quark-gluon interaction kernel in continuum approaches to the QCD bound-state problem.

Primary author: DE SOTO BORRERO, Feliciano (Universidad Pablo de Olavide)

Co-authors: Dr ZAFEIROPOULOS, Savvas (Institute for Theoretical Physics, Heidelberg University,); Dr BOUCAUD, Philippe (Universidad Paris Sud); Dr SEGOVIA GONZÁLEZ, Jorge (Universidad Pablo de Olavide); Dr RODRÍGUEZ-QUINTERO, José (Universidad de Huelva)

Presenter: DE SOTO BORRERO, Feliciano (Universidad Pablo de Olavide)

Session Classification: QCD

Contribution ID: 28

Type: **not specified**

Shear effects stemming from Modified Gravity

An appealing inflationary scenario that, for some models, resolves the problem of the flatness of the potential is called 'warm inflation'. In this model, there is a sizeable production of radiation alongside the inflationary expansion. The inflaton-radiation coupling leads to a significant enhancement of the power spectrum. One needs to consider an imperfect fluid that gives rise to dissipative effects that damp the growth of the fluctuations. However, shear effects can stem from a theory of modified gravity, so they will dominate over the enhancement. I will present a study of the effects of modified gravity on the power spectrum of primordial perturbations.

Primary authors: Dr KARCIAUSKAS, MINDAUGAS (UNIVERSIDAD COMPLUTENSE DE MADRID); TERENCE DÍAZ, JOSÉ JAIME (UNIVERSIDAD COMPLUTENSE DE MADRID)

Presenter: TERENCE DÍAZ, JOSÉ JAIME (UNIVERSIDAD COMPLUTENSE DE MADRID)

Session Classification: Coffee break + Poster session

Contribution ID: 29

Type: **not specified**

Melting the chiral condensate with acceleration: chiral symmetry restoration by the Unruh effect

The possibility of triggering the QCD phase transition using the Unruh effect is considered. We use Chiral Perturbation Theory at leading order and the large N limit (with N being the number of pions) as an effective description of low-energy QCD, and the Thermalization Theorem to compute the relevant partition function. In complete analogy with the inertial, finite-temperature case, we obtain that chiral symmetry is restored for uniformly accelerated observers with acceleration a larger than the critical value $a_c = 4\pi f_\pi$, with f_π being the pion decay constant.

Primary authors: CASADO TURRIÓN, Adrián (Universidad Complutense de Madrid); DOBADO, Antonio (Universidad Complutense de Madrid, Instituto IPARCOS)

Presenters: CASADO TURRIÓN, Adrián (Universidad Complutense de Madrid); DOBADO, Antonio (Universidad Complutense de Madrid, Instituto IPARCOS)

Session Classification: Coffee break + Poster session

Contribution ID: 30

Type: **not specified**

Exotic hadrons in the weak decay of Λ_b

We study the weak decay of the Λ_b baryon into $J/\psi\phi\Lambda$. This reaction is particularly interesting as it allows for the study of exotic or new hadron resonances in all the three two-particle channels (i.e, $J/\psi\phi$, $J/\phi\Lambda$ and $\phi\Lambda$).

It is interesting to study the final state interaction of J/ψ and ϕ , since as we know from experimental data that there are several exotic resonances in this channel. For the $\Lambda_b \rightarrow J/\psi\phi\Lambda$ decay, at the quark level, the most probable weak transition proceeds via the creation of a Λ baryon and a $D_s^* \bar{D}_s^*$ pair that is linked via the $X(4160)$ resonance to the finally observed $J/\psi\phi$ pair. A similar process involving resonance production via $X(4140)/X(4160)$ was considered in [1] but studying the $B^+ \rightarrow J/\psi\phi K^+$. We will show that exotic X resonances can be clearly seen by studying the invariant mass spectrum of $J/\psi\phi$ pairs from $\Lambda_b \rightarrow J/\psi\phi\Lambda$ decay.

The hidden-charm pentaquark $P_C(4450)$, observed recently by the LHCb collaboration [2], may be of molecular nature, as advocated by some chiral unitary approaches that also predict pentaquark partners in the strangeness $S = -1$ sector [3]. This strange hidden charm pentaquark can be produced via $J/\psi\Lambda$ final state interaction in our reaction and, as we shall see, traces of such a state can be seen in the $\Lambda_b \rightarrow J/\psi\phi\Lambda$ decay by studying the invariant mass spectrum of $J/\psi\Lambda$ pairs. A similar study and conclusions have been performed in [4], but studying the $\Lambda_b \rightarrow J/\psi\eta\Lambda$ decay.

Finally, in the $\phi\Lambda$ invariant mass spectrum, we might look for the presence of a Λ resonance around $2150 MeV$ that has been predicted in Ref [5] as dynamically generated in a chiral unitarity approach.

References:

- [1] En Wang, Ju-Jun Xie, Li-Sheng Geng, and Eulogio Oset, Phys. Rev. D97, 014017 (2018).
- [2] R. Aaij, B. [LHCb collaboration], Phys. Rev. Lett. 115, 072001 (2015).
- [3] J.J. Wu, R. Molina, E. Oset and B.S. Zou, Phys. Rev. Lett. 105, 232001 (2010); Phys.Rev. C84, 015202 (2011).
- [4] A. Feijoo, V.K. Magas, A. Ramos and E. Oset, Phys. Rev. D92, 076015 (2015).
- [5] E. Oset and A. Ramos, Eur. Phys. J. A44, 445 (2010).

Primary authors: Mr SOMASUNDARAM, Rahul (University of Barcelona); Prof. RAMOS, Angels (University of Barcelona); Prof. MAGAS, Volodymyr (University of Barcelona); Ms VIDAL, Julia

Presenter: Mr SOMASUNDARAM, Rahul (University of Barcelona)

Session Classification: Coffee break + Poster session

Contribution ID: 35

Type: **not specified**

Dark Energy (R. Miquel)

Monday, 3 June 2019 15:15 (45 minutes)

(40'+5')

Presenter: MIQUEL, Ramon (IFAE)

Session Classification: Dark energy

Contribution ID: 36

Type: **not specified**

Flavour physics results (A. Oyanguren)

Tuesday, 4 June 2019 09:00 (45 minutes)

(40'+5')

Presenter: OYANGUREN, Arantza

Session Classification: Flavour

Contribution ID: 37

Type: **not specified**

Belle II (Y.Kwon)

Tuesday, 4 June 2019 09:45 (45 minutes)

(40'+5')

Presenter: KWON, Youngjoon (Yonsei University)

Session Classification: Flavour

Contribution ID: 38

Type: **not specified**

COMCHA: Computing Challenges for the HL-LHC, Spain (A. Oyanguren)

Tuesday, 4 June 2019 11:00 (30 minutes)

(25'+5')

Presenter: OYANGUREN, Arantza

Session Classification: Computing

Contribution ID: 39

Type: **not specified**

ANAIS experiment (M.L. Sarsa)

Tuesday, 4 June 2019 12:00 (45 minutes)

(40'+5')

Presenter: SARSA, María Luisa (Universidad de Zaragoza)

Session Classification: Dark Matter

Contribution ID: 40

Type: **not specified**

Effective field theories (V. Mateu)

Tuesday, 4 June 2019 15:00 (45 minutes)

(40'+5')

Presenter: MATEU, Vicent (Universidad de Salamanca)

Session Classification: Effective theories

Contribution ID: 41

Type: **not specified**

Nucleon tomography (A. Vladimirov)

Tuesday, 4 June 2019 17:00 (45 minutes)

(40'+5')

Presenter: VLADIMOROV, Alexey (Regensburg University)

Session Classification: QCD

Contribution ID: 42

Type: **not specified**

Cosmological neutrinos (S.R. Gozzini)

Tuesday, 4 June 2019 18:15 (45 minutes)

(40'+5')

Presenter: GOZZINI, Rebecca (IFIC)

Session Classification: Neutrinos

Contribution ID: 45

Type: **not specified**

Neutrino theory (G. Barenboim)

Thursday, 6 June 2019 11:00 (45 minutes)

(40'+5')

Presenter: BARENBOIM, Gabriela (University of Valencia and IFIC)

Session Classification: Neutrinos

Contribution ID: 46

Type: **not specified**

Neutrino experiments (I. Gil Botella)

Thursday, 6 June 2019 11:45 (45 minutes)

(40'+5')

Presenter: GIL BOTELLA, Inés (CIEMAT Madrid)

Session Classification: Neutrinos

Contribution ID: 47

Type: **not specified**

Modified gravity (S. Odintsov)

Tuesday, 4 June 2019 11:30 (30 minutes)

(25'+5')

Presenter: ODINTSOV, Sergei (ICE(CSIC) and ICREA, Barcelona)

Session Classification: Gravitation

Contribution ID: 48

Type: **not specified**

Fotografiando lo invisible: primera imagen de un agujero negro (J.L. Gómez)

Wednesday, 5 June 2019 20:30 (1 hour)

Public lecture

(presentation 45' + questions 15')

Presenter: GÓMEZ GÓMEZ, José L. (Instituto de Astrofísica de Andalucía - CSIC)

Session Classification: Public lecture: Event Horizon Telescope

Contribution ID: 49

Type: **not specified**

Course: the extraordinary case of light scalar mesons (J.R. Peláez)

Tuesday, 4 June 2019 15:45 (45 minutes)

(40'+5')

Presenter: PELÁEZ, José R. (Universidad Complutense de Madrid)

Session Classification: Special courses

Contribution ID: 50

Type: **not specified**

Course: the extraordinary case of light scalar mesons (J.R. Peláez)

Monday, 3 June 2019 14:30 (45 minutes)

(40'+5')

Presenter: PELÁEZ, José R. (Universidad Complutense de Madrid)

Session Classification: Special courses

Contribution ID: 51

Type: **not specified**

Auger experiment (G. Parente)

Wednesday, 5 June 2019 09:00 (45 minutes)

(40'+5')

Presenter: PARENTE, Gonzalo (Universidade de Santiago de Compostela / IGFAE)

Session Classification: Cosmic rays

Contribution ID: 52

Type: **not specified**

Cosmic rays (F. Giovacchini)

Wednesday, 5 June 2019 09:45 (45 minutes)

(40'+5')

Presenter: GIOVACCHINI, francesca (ciemat)

Session Classification: Cosmic rays

Contribution ID: 53

Type: **not specified**

EIC - Electron Ion Collider (C. Van Hulse)

Friday, 7 June 2019 09:45 (45 minutes)

(40'+5')

Presenter: VAN HULSE, Charlotte (University College Dublin)

Session Classification: Facilities

Contribution ID: 54

Type: **not specified**

Underground facilities (C. Peña Garay)

Friday, 7 June 2019 10:30 (45 minutes)

Presenter: PEÑA GARAY, Carlos (Laboratorio Subterráneo de Canfranc)

Session Classification: Facilities

Contribution ID: 55

Type: **not specified**

Telescope facilities (R. García)

Friday, 7 June 2019 11:45 (45 minutes)

(40'+5')

Presenter: GARCÍA, Ramón (Instituto de Astrofísica de Canarias)

Session Classification: Facilities

Contribution ID: 56

Type: **not specified**

Heavy ions (Y.-J. Lee)

Monday, 3 June 2019 16:00 (45 minutes)

(40'+5')

Presenter: LEE, Yen-Jie (Massachusetts Institute of Technology)

Session Classification: Heavy ions

Contribution ID: 58

Type: **not specified**

LHC: BSM theory (V. Sanz)

Thursday, 6 June 2019 12:30 (45 minutes)

(40'+5')

Presenter: SANZ, Verónica (Sussex)

Session Classification: LHC

Contribution ID: 59

Type: **not specified**

Course: dark matter (David Cerdeño)

Thursday, 6 June 2019 09:30 (1 hour)

(55'+5')

Presenter: CERDEÑO, David (IPPP, Durham University)

Session Classification: Special courses

Contribution ID: **64**

Type: **not specified**

CMS+ATLAS: experimental SM review (M. Pieri)

Monday, 3 June 2019 17:15 (45 minutes)

(40'+5')

Presenter: PIERI, Marco (Univ. of California San Diego)

Session Classification: LHC

Contribution ID: 65

Type: **not specified**

CMS+ATLAS: experimental BSM review (D. del Re)

Monday, 3 June 2019 18:00 (45 minutes)

(40'+5')

Presenter: DEL RE, Daniele (Università di Roma "La Sapienza")

Session Classification: LHC

Contribution ID: 66

Type: **not specified**

Standard Model fermion corrections to the Electroweak Chiral Lagrangian at one-loop level

We consider an effective non-linear Electroweak Chiral Lagrangian containing three would-be Goldstone bosons: ω^a which transform non-linearly as a triplet under $SU(2)_L \times SU(2)_R$ and a Higgs singlet h plus its couplings to fermions via Yukawa interactions. This low energy model is valid for the range $M_h, M_W, M_Z \ll s \ll 4\pi v \simeq 3 \text{ TeV}$.

\

Since the next-to-leading order corrections due to fermion loops are proportional to the mass of the fermion we have performed the calculation for the heaviest fermion: top quark. We present both the finite and divergent part to the one-loop contribution, finding an agreement with other authors for the latter.

Primary authors: DOBADO, Antonio (Universidad Complutense de Madrid, Instituto IPARCOS); QUEZADA CALONGE, Carlos (Universidad Complutense de Madrid); Prof. SANZ CILLERO, Juan J. (Universidad Complutense de Madrid)

Presenter: QUEZADA CALONGE, Carlos (Universidad Complutense de Madrid)

Session Classification: Coffee break + Poster session

Contribution ID: 69

Type: **not specified**

Course: gravitational waves (T. Dent)

Thursday, 6 June 2019 16:00 (1 hour)

(55'+5')

Presenter: DENT, Thomas (IGFAE, University of Santiago de Compostela)

Session Classification: Special courses

Contribution ID: 70

Type: **not specified**

Course: gravitational waves (T. Dent)

Thursday, 6 June 2019 18:30 (1 hour)

(55'+5')

Presenter: DENT, Thomas (IGFAE, University of Santiago de Compostela)

Session Classification: Special courses

Contribution ID: 71

Type: **not specified**

Obtaining hierarchies: phenomenology of an SU(2) extension in effective potential models

In the present work we study an extension of the SM with an additional SU(2) an scalar doublet. By using the Coleman-Weinberg mechanism, masses for both the gauge bosons and the scalars can be obtained. We also calculate the renormalized effective potential, depending on the masses and couplings of the model. With this formalism we obtain two sets of gauge bosons, in addition to the two scalars. We analyse the mass ratio of these sectors in order to obtain a hierarchy between them. With an appropriate choice of parameters we can have one of them in the SM range, while the other has much higher masses. The inclusion of SM fermions in the model will be discussed.

Primary author: ÁLVAREZ LUNA, Clara (UCM)

Presenter: ÁLVAREZ LUNA, Clara (UCM)

Session Classification: Coffee break + Poster session

Contribution ID: 72

Type: **not specified**

SKA Telescope (S. Camera)

Tuesday, 4 June 2019 12:45 (45 minutes)

Presenter: CAMERA, Stefano (U. Torino)

Session Classification: Facilities

Contribution ID: 73

Type: **not specified**

Coordinate Space Time Ordered Perturbation Theory

It is possible to express a general Green's function in momentum-space as a sum of (individually non-covariant) time ordered graphs. These are obtained by carrying out the energy integrals of the loop momenta in a Feynman diagram. In this representation internal lines travel on-shell but energy is not conserved at each vertex, while in a Feynman graph energy is conserved at each vertex but lines are off the mass shell. This picture is in deep connection with the Coleman-Norton representation and gives a nice interpretation of the Feynman parameters and a causality viewpoint.

We present here a derivation of the general form of time-ordered perturbation theory in coordinate-space representation for a cubic scalar non-gauged theory to all orders. The results are easily extended to diagrams with fermionic lines and they offer a clear picture on what space-configurations of internal vertices will give unavoidable divergencies. The expected factorization "pinch" surface soft, collinear and hard configurations of vertices appears in TOPT and the correct degree of divergence is reproduced.

Primary author: SALAS-BERNÁRDEZ, Alexandre (Universidad Complutense de Madrid)

Presenter: SALAS-BERNÁRDEZ, Alexandre (Universidad Complutense de Madrid)

Session Classification: Coffee break + Poster session