Abstract list

Guatemala, November 2016

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1 Plenary Talks

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2 Specialized Talks

Electroweak standard model with very special relativity
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The very special relativity electroweak Standard Model (VSR EW SM) is a theory with $SU(2)_L \times U(1)_R$ symmetry, with the same number of leptons and gauge fields as in the usual Weinberg-Salam model. No new particles are introduced. The model is renormalizable and unitarity is preserved. Besides, neutrino masses are generated. A VSR-invariant term will produce neutrino oscillations and new processes are allowed. In particular, we compute the rate of the decays $\mu \to e + \gamma$. All

these processes, which are forbidden in the electroweak Standard Model, put stringent bounds on the parameters of our model and measure the violation of Lorentz invariance. Violations of Lorentz invariance have been predicted by several theories of quantum gravity [J. Alfaro, H. Morales-Tecotl, and L. F. Urrutia, Phys. Rev. Lett. 84, 2318 (2000); Phys. Rev. D 65, 103509 (2002)]. It is a remarkable possibility that the low-energy effects of Lorentz violation induced by quantum gravity could be contained in the nonlocal terms of the VSR EW SM.

Scalar Field Dark Matter in Clusters of Galaxies

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One of the alternatives to the cold dark matter (CDM) model is the scalar field dark matter (SFDM), where the DM is a spin-0 scalar field with mass $m \sim 10^{-22} eV/c^2$ and positive self-interaction. Such ultra-light boson is thought to form a Bose-Einstein Condensate (BEC) which cosmologically behaves as CDM. The BEC solution assuming the Thomas-Fermi limit at zero temperature has some difficulties to describe the rotation curves of galaxies. However, it was found that when introducing finite-temperature corrections to the potential of the SF, exact analytic solutions with excited states emerge as solution of the Klein-Gordon eq., being capable to fit the rotation curves of galaxies and the velocity dispersions observed in dwarf spheroidal galaxies. In this work we explore the viability of such multistate thermal solution in the galaxy cluster regime. We fit the mass profiles of 13 galaxy clusters and compare with the universal Navarro-Frenk-White profile predicted from CDM simulations and the BEC model in the Thomas-Fermi limit. We found that the BEC model does not fit the dynamical masses observed in the galaxy clusters, but the exact thermal SFDM model agrees with the observations as well as the empirical CDM profiles, with the advantage that it is not an ad-hoc profile but it is derivable from the theory.

Naturalness of the MSSM Dark Matter

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There exists a vast literature examining the electroweak (EW) fine-tuning problem in supersymmetric scenarios, but little concerned with the dark matter (DM) one, which should be combined with the former. In this paper, we study this problem in an, as much as possible, exhaustive and rigorous way. We have considered the MSSM framework, assuming that the LSP is the lightest neutralino, and exploring the various possibilities for its mass and composition, as well as different mechanisms for annihilation of the DM particles in the early Universe (well-tempered neutralinos, funnels and co-annihilation scenarios). We also present a discussion about the statistical meaning of the fine-tuning and how it should be computed for the DM abundance, and combined with the EW fine-tuning. The results are very robust and model-independent and favour some scenarios with respect to others. These features should be taken into account when one explores "natural SUSY" scenarios and their possible signatures at the LHC and in DM detection experiments.

Pomeron and Odderon Regge trajectories from AdS/QCD models

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In this talk, I will review recent progress on the construction of Regge trajectories from AdS/QCD models. These trajectories will be constructed from Glueball state masses and will be related to the Pomeron for even spins, and to the Odderon, for odd spins. The AdS/QCD models that I will

discuss start from the original holographic softwall model and goes through some of its modifications. These modifications include dynamical corrections and anomalous dimensions coming from QCD Beta functions.

Strongly Coannihilating Dark Matter at the LHC

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The coannihilation mechanism plays a crucial role in determining the DM relic abundance in a plethora of new physics models. Recently, a general classification of simplified models for this mechanism has been presented in the Coannihilation codex. In particular, the thermal relic abundance of a pure Standard Model singlet DM candidate can naturally be explained by coannihilation with a new colored partner in the dark sector. In these models direct and indirect detection modes are suppressed, however, LHC probes provide striking signatures. On the one hand, a mediator which connects the DM and its colored partner to the visible sector gives rise to a novel dijet resonance plus missing transverse energy final state. In the case where the mediator lies beyond LHC detection, self-annihilation of the colored partner through its strong interactions solely determines the relic abundance. The major LHC signature then is pair-production of the colored partner leading to jets plus missing transverse energy.

Generalized Equations and Their Solutions in the (S,0)+(0,S) Representations of the Lorentz Group

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I present three explicit examples of generalizations in relativistic quantum mechanics. First of all, I discuss the generalized spin-1/2 equations for neutrinos. They have been obtained by means of the Gersten-Sakurai method for derivations of arbitrary-spin relativistic equations. Possible physical consequences are discussed. Next, it is easy to check that both Dirac algebraic equation $Det(\hat{p}-m) = 0$ and $Det(\hat{p}+m) = 0$ for $u-$ and $v-$ 4-spinors have solutions with $p_0 = \pm E_p = \pm\sqrt{\mathbf{p}^2+m^2}$. The same is true for higher-spin equations. Meanwhile, every book considers the equality $p_0 = E_p$ for both $u-$ and $v-$ spinors of the $(1/2,0)\oplus(0,1/2)$ representation only, thus applying the Dirac-Feynman-Stueckelberg procedure for elimination of the negative-energy solutions. The recent Ziino works (and, independently, the articles of several others) show that the Fock space can be doubled. We re-consider this possibility on the quantum field level for both $S = 1/2$ and higher spin particles. The third example is: we postulate the non-commutativity of 4-momenta, and we derive the mass splitting in the Dirac equation. The applications are discussed.

Asymmetry sharing between baryon and dark matter

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In this talk, I will describe scenario where baryon and dark matter share a common asymmetry through higher dimension effective operators. Once the mass of the dark matter is given as an input, the requirement of proper distribution of asymmetry among the two sectors (in accordance with observation) fixes the Wilson coefficients of the operators. From here, we can then calculate the signatures in collider, direct and indirect experiments.

Cusps Anomalous dimension and rotating open strings in ADS/CFT

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In the context of AdS/CFT we provide analytical support for the proposed duality between a Wilson loop with a cusp, the cusp anomalous dimension, and the meson model constructed from a rotating open string with high angular momentum. This duality was previously studied using numerical tools in *Caron-Huot, Henn.* Our result implies that the minimum of the profile function of the minimal area surface dual to the Wilson loop, is related to the inverse of the bulk penetration of the dual string that hangs from the quark–anti-quark pair (meson) in the gauge theory.

Renormalization Group Improvements in (A)dS-Charged Black Holes

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We study quantum modifications of the Reissner-Nordström-(A)dS black hole within Quantum Einstein Gravity, coupled to an electromagnetic sector. Quantum effects are introduced on the level of the improvements of the classical solution, where the originally constant couplings ($G0$, $\Lambda 0$, and $\alpha 0$) are promoted to scale dependent quantities (Gk, Λk, and αk). Those running couplings are calculated in the functional renormalization group approach. A crucial point of this, so called "improving solutions" procedure is the scale setting where the arbitrary scale k acquires physical meaning due to a relation to the coordinate scale r. One finds that for those improved solutions, there is no stable remnant and due to the appearance of a new internal horizon, there is also no necessity to impose a minimal black hole mass for charged black holes, in order to avoid the the cosmic censorship hypothesis.

Gravitino Phenomenology with the spinor helicity formalism

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Benemérita Universidad Autónoma de Puebla, Puebla, Mexico

In this talk we present the formal machinery needed to construct helicity amplitudes for massive gravitino in N=1 SUGRA. Finally, to appreciate the power of our method we present results for some processes at future colliders.

Doublet triplet fermion dark matter with neutrino masses

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In this work, we enlarge the doublet triplet fermion dark matter model by adding a scalar doublet and a scalar triplet. The addition of those scalar fields can rise up the Higgs diphoton decay, $R_{\gamma\gamma}$, thanks to the new charged states. Moreover, we will show that the role of these new scalars are not only in the Higgs diphoton decay enhancement but they are very important in the neutrino mass generation.

Astrophysical interpretation of Extraterrestrial neutrino excess measured by IceCube experiment

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In the last years the IceCube collaboration collected the largest astrophysical neutrino sample ever obtained up to PeV energies. The investigation of the origin of these events excites the astroparticle community and several hypotheses are now under debate. In this presentation I will show a possible phenomenological scenario to explain the measured astrophysical neutrino flux. In particular will be introduced of a comprehensive model of radially-dependent cosmic-ray transport to calculate expected diffuse galactic neutrinos. To explain the full sky neutrino excess, the needed extragalactic component will also be discussed with a review of possible extragalactic source candidates. Moreover will be shown the role of Mediterranean neutrino telescope to constrain the presented scenarios.

Photon emission in QGP using AdS/QCD models at finite chemical potential.

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In this work we present the results for the emission rate for real photons, that could be ultra soft, soft or hard, using the most common approximations in AdS/QCD models: hard wall model and soft wall model. Also we calculate the electrical conductivity in both AdS/QCD approximations.

U(1) model anomaly free for three families

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We present a new gauge model U(1) anomaly free for three families beyond the Standard Model. The model is no universal for quark families. But it is leptón families. A new top quark and two bottom exotic quarks are necessary for the cancellation of the anomaly. Also three sterile neutrinos. The model needs a singlet scalar field to break the U(1) symmetry and two doublet scalar fields to give masses to the standard particles.

Suppressed $B \to PV$ CP asymmetry: CPT constraint

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Charge Parity asymmetry in charmless B meson decays is a key issue to be understood. Many theoretical calculations have been performed using short distance factorization approaches which, in general, do not take into account the CPT invariance constraint. For each channel with CP violation there is an equal amount of CP asymmetry in another channel or other channels, with an opposite sign. This happens if these channels are coupled through final state interactions (FSI). In the specific process $B \to PV$, involving one pseudo-scalar and one vector particle in the final state, we argue that the CP asymmetry, inherent from a short distance mechanism, could be suppressed due to the CPT constraint. In this case, we propose a sensitive and practical experimental method to identify even a small CP asymmetry, which provides the values for A_{CP} without the need for an amplitude analysis. This method, if applied directly to data, will enable to extract the CP asymmetry information in a model independent way and check to which extend the suggested suppression due to the CPT constraint is verified.

Redefining the axion window

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A major goal of experimental axion searches is reaching inside the parameter space region of realistic axion models. Currently, the boundaries of this region depend on somewhat arbitrary criteria, and it would be highly desirable to specify them in terms of precise phenomenological requirements. We consider hadronic axion models and classify the representations R_Q of the new heavy quarks Q requiring that (i) R_Q allows for Q decays fast enough to avoid issues with long lived strongly interacting relics; (ii) no Landau poles are induced below the Planck scale. Fifteen representations satisfy these criteria, and define a phenomenologically preferred axion window bounded by a maximum (minimum) value of the axion-photon coupling which is twice (four times) stronger than commonly assumed. The simultaneous presence of more R_Q's cannot yield stronger couplings; however, for specific pairs of R_Q, complete axion-photon decoupling is possible.

Higgs to gamma gamma decay with 12.9 fb-1 of 13 TeV data

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Flavor-changing mediated by scalar at loop-level

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We explore the Flavor-Changing mediated by scalar boson in the h to gamma gamma at loop level. The analysis is focused on the Two-Higgs Doublet Model and considering different scenarios for the process; besides we will show allowed regions for the free parameters and deviation of the LHC data.

Phenomenology of scotogenic models

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We analyze the present bounds of several scotogenic models, in which an additional Z_2-odd set of scalars and fermions multiplets under $SU(2)_L$ are added to the Standard Model (SM). The symmetry guarantee that the lightest Z_2-odd neutral particle is stable, providing a natural dark matter (DM) candidate, and leads to suppressed neutrino masses generated by a one-loop realization of the effective Weinberg operator. This operator involves the generic coupling of the lepton doublets with both Z_2-odd scalar and fermion multiplets. Including larger fermion representations also implies that these fermions interact with the electroweak gauge bosons, leading to significantly large production cross-sections at the LHC. For suitable choices of the spectrum and sufficiently high $SU(2)_L$ representations these new Yukawa interactions lead to the decay of the Z_2-odd fermions, opening the possibility to generate collider signals of dileptons plus missing transverse energy.

Quark and Higgs sectors in 7+1 dimensional extended spin space

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An extended spin-space model in 7+1 dimensions is presented that describes the standard-model electroweak quark sector. The model contains up to four generations of massless and massive quarks and two-Higgs doublets. Additional mass operators without a Higgs origin are obtained that admit a flavon interpretation. After symmetry breaking, the Higgs fields give rise to a vertical hierarchy effect (within generations), while the flavon elements produce a horizontal one (across generations).

CMB Power Spectrum in Delta Gravity

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We present a gravitational field model based on two symmetric tensors. We call this model Delta Gravity (DG). We want to compute the CMB Power Spectrum in this theory in order to compare with the standard theory and measurements. In this talk we will show preliminar results of the calculation of the CMB Power Spectrum in the Hydrodynamic limit. For further discussion we investigate the extension of the gauge transformation in DG and how it works when we choose the Newtonian or Synchronous Gauge.

Supersymmetry and extended spin Model

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The spin-extended model is a standard-model extension that introduces additional spin-like degrees of freedom, similarly to the Kaluza-Klein idea. For given dimension, it reproduces standard-model elements, as it predicts global or local scalar symmetries, and it also constrains the field representations. Both, the symmetry and representation spaces are properly described by Clifford algebras. This work explores the supersymmetric extension of the model, as supersymmetry's fermion and boson have common spaces can also be classified in terms of Clifford algebras. In particular, for $5+1$ dimensions, the quiral $SU(2)$ symmetry arises..

Recent results of searches for beyond Standard Model physics in ATLAS

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Recent results of searches for beyond Standard Model physics in ATLAS are presented, with particular focus on searches for new phenomena in high jet multiplicity final states. No significant excess are observed and limits are set on several signal models.

s-sbar asymmetry in proton using wave functions inspired by light front holography

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We consider different light-front wave functions inspired by light front holography, together with a model of the nucleon that consider meson-baryon fluctuations to give predictions for the nonperturbative (intrinsic) contribution to the strange / anti-strange asymmetry in the proton sea. The holographic wave functions for an arbitrary number of constituents, recently derived by us, give results quite close to known parametrizations that appear in the literature.

The Coherent Neutrino-Nucleus Interaction Experiment (CONNIE)

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Coherent neutrino-nucleus scattering is an interaction predicted by the Standard Model in which a neutrino interacts with the nucleus as a whole, rather than with an individual nucleon. This process is characterized by a significantly enhanced cross-section at low neutrino energies, several orders of magnitude higher than that of other neutrino interactions. However, it has not yet been observed experimentally, since the nuclear recoil energies involved are only of the order of 10 keV and lie below the energy threshold of most detectors. Coherent neutrino-nucleus scattering is of great interest, since it can act as a probe for physics beyond the Standard Model and might also become a limiting background for dark matter experiments. The Coherent Neutrino-Nucleus Interaction Experiment (CONNIE) aims to make the first measurement of this process and investigate its cross-section in the low-energy regime. It uses an array of cryogenically cooled charge-coupled device (CCD) detectors to observe particle interactions. The high detection efficiency, low noise and dark current, and high spatial resolution of CCDs, make them ideally suited for the detection of nuclear recoils. A prototype detector consisting of four CCD units (4g total mass) is taking data at the nuclear power plant in Angra dos Reis, Brazil, since 2015. The Angra 2 nuclear reactor ($3.8 GW_{th}$) serves as a high-intensity antineutrino source. The detector is located in a container 30m from the reactor core and is exposed to an antineutrino flux of $7.8 \cdot 10^{12} cm^{-1} s^{-1}$. External background is significantly reduced with a passive shielding (lead and polyethylene). About one year of data was collected and analyzed, and a stable background rate and noise level of $< 2e^-$ RMS were demonstrated. In addition, techniques for particle identification and background rejection techniques can be studied and evaluated. This successful engineering run confirmed the possibility of neutrino searches with CCDs. The detector was upgraded to its final configuration in mid 2016 and is taking data with 18 CCD units with a total mass of 100g, and is expected to be sensitive to coherent neutrino-nucleus scattering as predicted by the Standard Model.

3 Poster session

Valid CP violation phase regions obtained from standard parameterization of the lepton mixing matrix

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In the present work we use the usual parameterization for the Pontecorvo-Maki-Nakagawa-Sakata leptonic mixing matrix U_{PMNS} and its construction in terms of the charged lepton and neutrino mixing matrices, $U_{PMNS} = U_l^+ * U_\nu$, to establish a set of equations that relate the neutrino mixing angles with the Dirac phase. A Monte Carlo method analysis using experimental constraints and

different textures for the neutrino mixing matrix is then used to estimate allowed regions for the Dirac phase values.

On gravitational waves and EFT methods for binary systems

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We study gravitational radiation emitted by a binary system in the inspiral phase when the binary components moves in a circular orbit to non relativistic velocities. We use effective field theory (EFT) methods in the Post-Newtonian (PN) framework (Goldberger, Rothstein, 2006) where it is possible to do an expansion in power of the orbital velocity. The EFT allows to do a separation of the relevant scales in the binary system in order to determine observables at each scale. Using scaling arguments power counting rules can be constructed in terms of the orbital velocity in order to determine at which power in velocity the terms in the effective action contribute to a given observable. After knowing how the effective action terms scales with the velocity the correction to second order in velocity of the gravitational potential between the components of the binary is computed. The action at order 5/2 in velocity which is used to compute the radiation power in gravitational waves is also determined. And finally it is possible to find that tidal effects encoded in curvature depended operators start to take place at order ten in velocity while abortion effects contribute to order eight in velocity.

Water Cherenkov detector for the Latin American Giant Observatory collaboration

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Our goal was to build and calibrate two water Cherenkov detectors (WCD) for the Latin American Giant Observatory (LAGO) collaboration. We used the data acquisition software ACQUA, developed by members of the collaboration to obtain raw data, and calibrated the signals through the histogram mode developed by the collaboration, as well. This calibration classifies signals according to integrated charge, particularly using the vertical equivalent muon (VEM). For our first tank, we obtained a value of VEM of (250 ± 20) ADCq for data acquired on August 23, 2016. For this run, a naive Bayes classifier method correctly classified 56% of incoming signals according to their amplitude and rise time (a result greatly above 25%, for random guessing). An alternative method using K-Nearest-Neighbor data clustering showed similar results. Additionally, a Monte Carlo simulation was developed for the first tank showing great accordance to signal identification performed by the mentioned methods. The simulation was developed in Geant4, using experimentally determined values of Tyvek reflectivity and water absorption for our tank. The second tank incorporates Red Pitaya hardware: this is the first time Red Pitaya hardware is incorporated to a WCD in the LAGO collaboration. Much of the analysis is still pending for the second tank. Nevertheless, so far the implementation of Red Pitaya hardware vastly improved the 40MHz sample rate by tripling it, in turn improving resolution of rise-time. Furthermore, the use of pressure sensors alongside Red Pitaya will enable Forbush Decrease detection for future research.

Non-Fritzsch Five-Zero Texture like Quark Mass Matrices in the Standard Model

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We will consider a non-Fritzsch five-zero texture for the quark mass matrices in the Standard Model, that is completely valid and generates all the physical quantities involved, including the quark masses, the Jarlskog invariant quantity and the inner angles of the Cabibbo-Kobayashi-Maskawa unitarity triangle, and it explains the charge parity violation phenomenon at 1σ confidence level. To achieve this, non-physical phases must be included in the unitary matrices used to diagonalize the quark mass matrices, in order to put the Cabibbo-Kobayashi-Maskawa matrix in standard form. Besides, these phases can be rotated away so they do not have any physical meaning. Thus, the model has a total of nine parameters to reproduce ten physical quantities, which implies physical relationships between the quark masses and or mixings.

Neutrino Oscillation in long baseline experiments

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In this poster the author is going to talk about neutrino oscillations and simulations for future long baseline experiment DUNE.

Peskin-Takeuchi parameters in triplet scalar extensions to the Standard Model

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The corrections to the S and T parameters induced by electroweak triplet scalars up to one loop order are calculated in the framework of an Effective Field Theory. We consider the most general renormalizable potential including a triplet, with hypercharge 0, coupled with the Standard Model particles and an explicit mass term for the triplets. The hierarchy between the mass scale of the triplets and the weak scale allows for a Effective Field Theory analysis where the gauge symmetries of the Standard Model remain unbroken after the integration of the heavy fields. Moreover, the only quantities that enter in the result are dimensionless ratios the other being absent due to decoupling reasons.

Spin Chain Chaos

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One of the most studied statistical models is the Ising model. This model does not present phase transitions in the one dimensional case, but it does on the two dimensional case. Particularly, this model can be modeled during a phase transition with two dimensional conformal field theories (CFT). An interesting property to investigate is quantum chaos during this phase transitions. By using out of time order corelators, it's found that spin is quantum chaotic.

Some features of a new one-family flipped-SU(6) GUT model

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We proposed a new one-family $\mathrm{SU}(6)\otimes\mathrm{U}(1)_X$ GUT model corresponding to the flipped-SU(6) whose multiplets have interchanged u and ν with d and e, respectively. Firstly, the cancellation of chiral anomalies require two $\bar{\mathbf{6}}$, one $\mathbf{15}$ and three $\mathbf{1}$ multiplets in such a way that the model includes exotic quarks and leptons. Secondly, the correct SSBs employ many Higgs fields: $\mathbf{\Phi}\in\mathbf{35}$, $H_1, H_2 \in \bar{\mathbf{6}}$ and $H_3, H_S \in \mathbf{15}$ whose VEVs conduce the following SSB chain: $\mathrm{SU}(6)\otimes\mathrm{U}(1)_X \rightarrow$

$\mathrm{SU(3)}_C \otimes \mathrm{SU(3)}_L \otimes \mathrm{U(1)}_X \otimes \mathrm{U(1)}_D \to \mathrm{SU(3)}_C \otimes \mathrm{SU(2)}_L \otimes \mathrm{U(1)}_Y \to \mathrm{SU(3)}_C \otimes \mathrm{U(1)}_Q$ and each transitions happened at GUT, TeV and GeV scales, respectively. In the same way, every fermion in the model acquires mass by the VEVs of each Higgs field trough Yukawa couplings with the feature that exotic fermions have mass at TeV scale. Moreover, the SM neutrino acquires mass trough see-saw mechanisms involving it, the exotic neutrinos and a sterile ν_S neutrino coupled trough H_S with the others. Furthermore, the model contains four neutral vector bosons: A, Z, Z' and Z'' where the two former are the photon and Z-boson while the two latter are new Z-bosons at TeV scale. Lastly, the model contains an effective three Higgs-triplet model which introduces a great variety of physical charged, scalar and pseudoscalar bosons including the Higgs boson, but also there are a lot of colored scalar bosons at GUT scale which mediate leptoquark interactions.

Analysis of nonleptonic charmonium modes $B_s^0 \to J/\psi(\phi(1020), f_2'(1525))$ and $B_s^0 \to J/\phi K^- K^+$

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Exclusive nonleptonic decays of heavy mesons $B(s)$ offer a good scenario for studying, at theoretical and experimental levels, CP violation and possible effects of physics beyond the Standard Model. Some of these channels provide methods for determining the angles of the unitarity triangle, allow to study the role of QCD and test some QCD-motivated models (see for example some recent reviews in Ref 1). These topics are of great interest in particle physics and the knowledge of them will be improved with forthcoming experiments at Large Hadron Collider (LHC) [2]. Nonleptonic $B(s)$ decay modes involving vector charmonium mesons J/ϕ in final states, particularly color-suppressed modes which are induced by quark level transitions $b \to c\vec{c}s$, are of great experimental interest because of the clean signal reconstruction ($J/\psi \to \mu^+\mu^-$). These include vector-vector mode $B \to J/\psi K*(892)$ where the phase β, $B0 - \vec{B}0$ mixing parameter, can be extracted from this CITE. In addition, decay modes with higher excitations of the K meson such as $B \to J/\psi K0*(1430), J/\psi K*(1410)$, $J/\psi K2*(1430)$ (among others), might offer complementary measurement on β CITE. On the other hand, the Bs counterpart $Bs0 \to J/\psi\phi(1020)$ The first one concerns the phase βs, extracted from the angular analysis of the time-dependent differential decay width in the process $Bs0 \to J/\psi\phi(1020)$ The $Bs0 \to J/\psi\phi(1020)$ channel is well known final states at higher K^+K^- masses have not previously been studied. They observed a significant signal in the $f20(1525)$ region While a large $\phi(1020)$ contribution is well known and the $f20(1525)$ component has been recently observed and confirmed. The $f20(1525)$ tensor meson component in the decay sequence $Bs0 \to J/\phi f20(1525)[\to K^+K^-]$ recently observed by D0 Collaboration [1] has confirmed the earlier LHCb observation [2]. The absolute branching fractions of the mode $Bs0 \to J/\psi f20(1525)$ and the entire mode $Bs0 \to J/\psi K^+K^-$ (including resonant and non-resonant contributions) were first measured by LHCb [3] and later confirmed by Belle [4] (see Table I). Both measurements are in good agreement each other. But the summary is now underway

Señales generadas por eventos solares en detectores Cherenkov de agua

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En este trabajo se presenta el análisis de datos de eventos solares detectados por un sistema Cherenkov de agua, El detector cuenta con dos sistemas de adquisición de datos principales: el de eventos particulares y el de suma total o scales, en este trabajo se hará uso del sistema de conteo llamado TDC Scalers, que registra la tasa de conteo del número de partículas que incidieron en el detector en un intervalo de tiempo dado. En este trabajo se estudia la respuesta espacial de los

canales de cada tanque, esto nos indicará cuáles son los PMT's que se cambiaron su tasa de conteo durante un evento Forbush. Los Decrecimientos Forbush son eventos que generalmente indican un decremento en la tasa de conteo de rayos cósmicos, causado por un evento interplanetario transitorio como es el caso de una eyección de masa coronal en el Sol. En específico estudiaremos un evento observado en junio del año 2015.

Neutrino masses in the $SU(4)L \otimes U(1)XSU(4)L \otimes U(1)X$ electroweak extension of the standard model

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We study the neutrino mass generation in the $SU(4)L \otimes U(1) \otimes SU(4)L \otimes U(1)X$ electroweak extension of the Standard Model by considering nonrenormalizable dimension 5 effective operators. It is shown that there exist two topologies for the realizations of such an operator at the tree-level and for one of the three-family models the neutrino phenomenology is explored after extending its particle content with an $SU(4)LSU(4)L$ fermion singlet and a scalar decuplet. Constraints in the available parameters space of the model are partially discussed.

Analysis of excited heavy quarks in quiver theories

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Quiver theories can be obtained from AdS_5 theories, with fields in the bulk, via deconstruction. In these theories is possible to generate large scale hierarchies with few sites. And then we can compute the spectrum involving excited states of the fermions and their couplings, such that the phenomenology of the quark excitations at the LHC is studied. We analyze the collider phenomenology of single heavy top production at 13 TeV, considering the contribution of the heavy gluon both as part of the production cross section and as a possible decay product of the excited top quark.

About electric dipole moment of the electron

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Recent measurements indicate a possible change in the lower limit for the time of electric electron dipole. The moment of nonzero dipole involves breaking discrete symmetry CP. These facts suggest chiral couplings conventional electrodynamics of Dirac. The chirality involved in quantum electrodynamics processes may be effects from emerging events axial sector of matter such as axion. And these tensor representations can also be revealing effects of the scales of grand unification theories as interactions with bosons mass range of 10^{16} GeV. In this contribution we will discuss our advances present with respect to understanding the moment of electric dipole electron and its correlções with physical beyond the standard model

Energy loss of a Supernova through the process $e^+e^- \to \nu\bar{\nu}$ in a 331 Model

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When a massive star at the end of its life collapses into a neutron star, it radiates most of its energy in the form of neutrinos, most of them with energies in the range of 10 to 30 MeV. In this research project a study about the relation between particle physics, astrophysics, and astronomy is realized through the neutrinos. An analytical expression is determined for the energy loss of the supernova through the neutrinos emission due the neutrinos pair production, resulting from the reaction $e^+e^- \to \nu\bar{\nu}$, in the context of a 331 Model, which is an extension of the Standard Model of the strong, weak and electromagnetic interactions. Furthermore a numerical analysis of the energy loss $Q^{331}_{\nu\bar{\nu}}$ of the supernova is made as a function of the mixing angle θ' from de Model 331 and as a function of the degenerating parameter β. Also a study is performed on the relative change $R = \frac{Q^{331}_{\nu\bar{\nu}} - Q^{SM}_{\nu\bar{\nu}}}{Q^{SM}_{\nu\bar{\nu}}}$ for distinct values of θ' and β.