DSU2010
The Dark Side of the Universe 2010

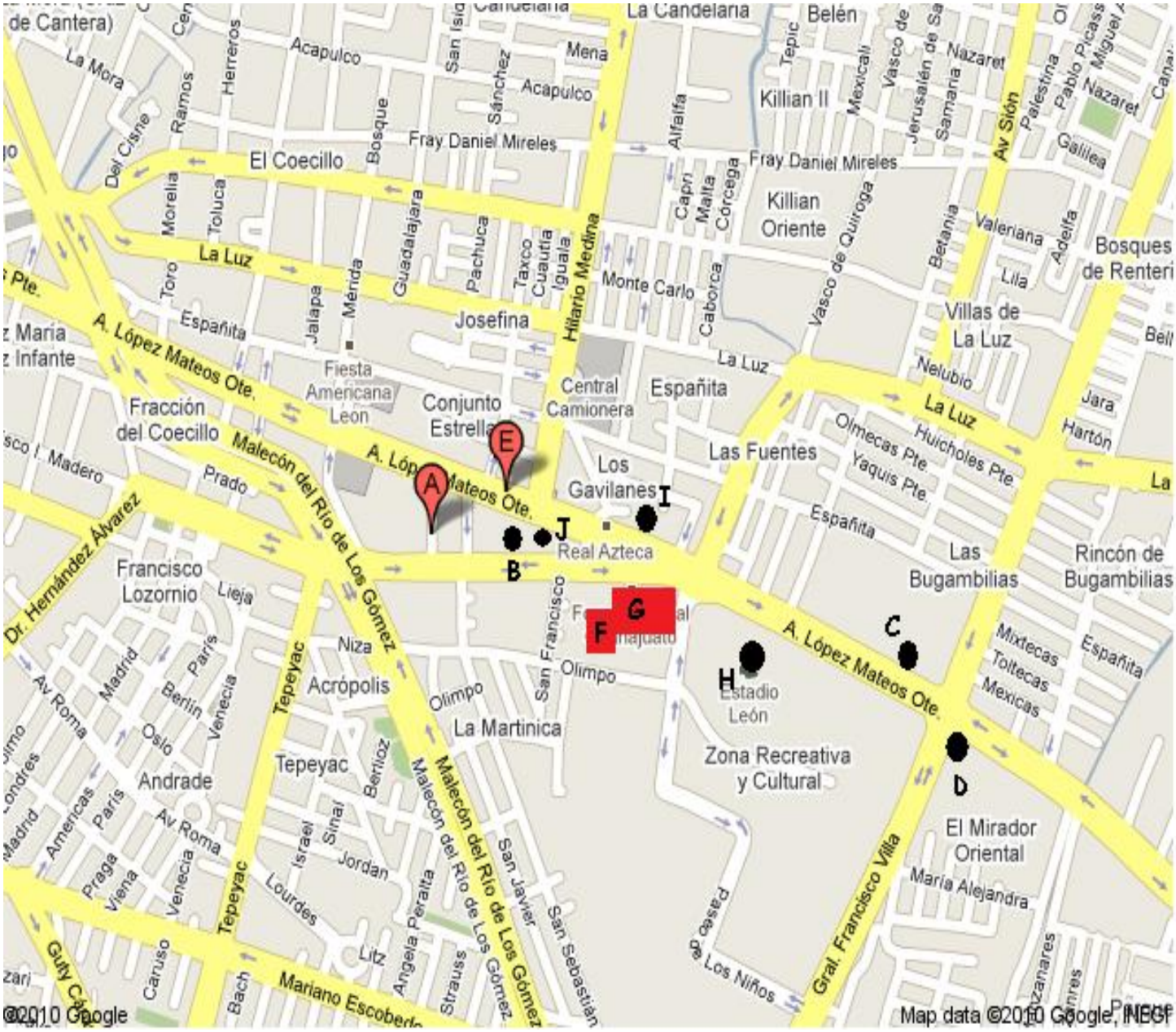
Tuesday 1 June 2010- Sunday 6 June 2010

Auditorium Jorge Ibargüengoitia, Arts and History Department

Physics Department, University of Guanajuato

Programme

Venues and Surroundings



A. ARGENTINIAN-MEXICAN RESTAURANT “RINCON GAUCHO”

B. HOTEL: “HOLIDAY INN”

C. HOTEL: “REAL DE MINAS (POLIFORUM)”

D. HOTEL: “REAL DE MINAS EXPRESS”

E. MEXICAN RESTAURANT

F. AUDITORIUM OF THE ARTS AND HISTORY DEPARTMENT “JORGE IBARGÜENGOITIA”, CONFERENCE VENUE (FORUM CULTURAL)

G. MUSEUM OF ARTS AND HISTORY IN GUANAJUATO (FORUM CULTURAL)

H. FOOTBALL STADIUM

I. MEXICAN RESTAURANT: “EL BRASERÍO”

J. ARGENTINIAN RESTAURANT

Timetable

Monday 31/05

Time	Place
5:00 p.m. - 8:00 p.m. Registration	Auditorium Jorge Ibargüengoitia (J.I.) Lobby
8:00 p.m. - 10:00 p.m. Welcome Cocktail	Arts Balcony “Terraza”

Tuesday 1/06

S1 (8:45 am - 10:30 am)
Conveners: Magda Lola

Time	Title	Presenter
8:45 am	Opening	
9:30 am	Dark Matter Direct Detection Experiments (I)	CDMS Oleg Kamaev (University of Minnesota)
10:00 am	Dark Left-Right Model: CDMS, LHC, ect..	Ernest Ma (Riverside U.C.)

Coffee Break (10:30 am - 11:00 am)

S2 (11:00 am - 1:00 pm)
Conveners: Magda Lola

Time	Title	Presenter
11:00 am	Cosmic-ray Signatures of Dark Matter Decay	Alejandro Ibarra (Technical University of Munich)
11:30 am	The CHASE Probe for Chameleon Dark Energy	Jason Steffen (FERMILAB)
12:00 m	Searching for Dark Matter: The Diurnal Variation in Directional Experiments	J. D. Vergados (CERN & Ioannina U.)
12:30 pm	Scalar Field Dark Matter Model	Tonatiuh Matos (CINVESTAV)

Lunch (1:00 pm – 3:30 pm)

S3 (3:30 pm – 5:00 pm)
Conveners: Carlos Muñoz

Time	Title	Presenter
3:30 pm	Indirect Search for Dark Matter with the ANTARES Neutrino Telescope	Vincent Bertin (CPPM-Marseille)
4:00 pm	New Idea for Charged Lepton Flavor Violation Search Using a Muonic Atom.	Yamanaka Masato (Kyoto Sangyo University)
4:30 pm	Dark Matter in SuperGUT Unification Models	Keith Olive (University of Minnesota)

Coffee Break (5:00 pm – 5:30 pm)

S4 (5:30 pm – 6:30 pm)
Conveners: Carlos Muñoz

Time	Title	Presenter
5:30 pm	Dark Matter from the UV Completion of Gravity	Jose A. R. Cembranos (University of Minnesota)
6:00 pm	Modulation of Dark Matter Direct Detection Signals Due to Orbital (annual) and Axial (diurnal) Motion of the Earth	Debasish Majumdar (Saha Institute of Nuclear Physics,

	at Recoil Direction Sensitive Detectors	Kolkata, India)

POSTER SESSION (6:30 PM – 8:00 PM) AUDITORIUM J.I. LOBBY

Wednesday 2/06

S1 (8:45 am - 10:30 am)
Conveners: Keith Olive

Time	Title	Presenter
09:00 am	A Constant Dark Matter Halo Surface Density in Galaxies	Christiane Frigerio Martins (Universidade Federal do ABC-São Paulo)
09:30 am	Gamma Ray Line Generated by Anomalies	Yann Mambrini (LPT Orsay)
10:00 am	Dark Matter and Collider Physics	Carmine Pagliarone (INFN, FNAL)

Coffee Break (10:30 am - 11:00 am)

S2 (11:00 am - 1:00 pm)
Conveners: Keith Olive

Time	Title	Presenter
11:00 am	Realistic Inflation Models and Primordial Gravity Waves	Qaisar Shafi (Bartol Research Inst. and Delaware U.)
11:30 am	The Fermi Large Area Gamma Ray Telescope and the Current Searches for Dark Matter in Space	Aldo Morselli (INFN Roma Tor Vergata)
12:00 m	Identification of Dark Matter particles with LHC and direct detection data	David G. Cerdeño (Universidad Autónoma de Madrid & Instituto de Física Teórica)
12:30 pm	Radio and Gamma-ray Constraints on Dark Matter Annihilation in the Galactic Center	Csaba Balazs (Monash University)

Lunch (1:00 pm – 3:30 pm)

S3 (3:30 pm – 5:00 pm)
Conveners: Qaisar Shafi

Time	Title	Presenter
3:30 pm	The Universe at the Highest Energies: The JEM-EUSO Space Mission.	M.D. Rodríguez Frías (Grupo de Espacio y Astropartículas. Universidad de Alcalá)
4:00 pm	Results from the Cryogenic Dark Matter Search Experiment (II)	Oleg Kamaev (University of Minnesota)
4:30 pm		Axel de la Macorra (UNAM & IAC)

Coffee Break (5:00 pm – 5:30 pm)

S4 (5:30 pm – 6:30 pm)
Conveners: Qaisar Shafi

Time	Title	Presenter
5:30 pm	Gravitino Dark Matter and LHC Searches in R-violating Supersymmetry	Professor Magda Lola (Dept. of Physics, University of Patras, Greece)
6:00 pm	Lepton Flavor Violation Signals from GUT theories	Mario E. Gómez

		(Universidad de Huelva)

Thursday 3/06

Trip to Dolores Hidalgo - San Miguel de Allende – Guanajuato (RUTA 2010)
Time to leave: 7:30 am
We leave from the conference venue. The bus will be waiting us just outside the Arts and History building, where the conference is being held, near the parking space in San Francisco street.
We will return at midnight, the bus will leave us in the same place.

Friday 4/06

S1 (8:45 am - 10:30 am)
Conveners: Axel de la Macorra

Time	Title	Presenter
09:00 am	Unification Models of Inflation, Dark Matter and Dark Energy	Luis Ureña (Universidad de Guanajuato)
09:30 am	Testing the Supersymmetric Seesaw with Leptogenesis	Azar Mustafayev (University of Minnesota)
10:00 am	Dark Matter Distribution at Galactic and Sub-galactic Scales	Octavio Valenzuela (IA-UNAM)

Coffee Break (10:30 am - 11:00 am)

S2 (11:00 am - 1:00 pm)
Conveners: Axel de la Macorra

Time	Title	Presenter
11:00 am	A New Supersymmetric Standard Model and Gravitino Dark Matter	Carlos Muñoz (Madrid Autonoma U. & Madrid, IFT)
11:30 am	T2K Collaboration	Vladimir Kravtsov (Colorado State University)
12:00 m	Impact of Internal Bremsstrahlung on the Detection of Gamma-rays from Neutralinos	Mirco Cannoni (Universidad de Huelva)
12:30 pm	The Dark and Stellar Mass Assembling of Galaxies as a Probe of the LCDM Cosmology	Vladimir Avila-Reese (Instituto de Astronomia, UNAM)

Lunch (1:00 pm – 3:30 pm)

S3 (3:30 pm – 5:00 pm)
Conveners: Yamanaka Masato

Time	Title	Presenter
3:30 pm	Direct Detection of Dark Matter with MiniCLEAN	Raul Hennings-Yeomans (Los Alamos National Laboratory)
4:00 pm	Spin Dependent Results from DRIFT	Mark Pipe (University of Sheffield)
4:30 pm	Measuring Lepton Flavour Violation at LHC with Long-Lived Slepton in the Coannihilation Region	Joe Sato (Saitama University)

Coffee Break (5:00 pm – 5:30 pm)

S4 (5:30 pm – 7:00 pm)
Conveners: Yamanaka Masato

Time	Title	Presenter
5:30 pm	LIPSS Free-Electron Laser Searches for Dark Matter	James R. Boyce

		(Jefferson Lab)
6:00 pm	Viscous Cosmology	Mahmoud Wahba (Egyptian Center for Theoretical Physics, MTI)
6:30 pm	The Spin(4,C) Ocean and its Currents: Dark Energy and Matter	Marcus S. Cohen (New Mexico State University)

Saturday 5/06

S1 (9:00 am - 10:30 am)
Conveners: James R. Boyce

Time	Title	Presenter
9:00 am	Inquiry as to if Higher Dimensions Can be Used to Unify DM and DE	Andrew Walcott Beckwith (American Institute of Beam Energy Physics)
9:30 am	Channeling Effects in Direct Dark Matter Detectors	Nassim Bozorgnia (UCLA)
10:00 am	Higgs Decay in Higgs Portal Dark Matter Models	Osamu Seto (Hokkai-Gakuen University)

Coffee Break (10:30 am - 11:00 am)

S2 (11:00 am - 1:00 pm)
Conveners: James R. Boyce

Time	Title	Presenter
11:00 am		Octavio Obregón (DCI-Universidad de Gto.)
11:30 am	AUGER Collaboration	Gustavo Medina Tanco (ICN-UNAM)
12:00 m	Dark Route to Quantum Gravity	Pedro F. González Díaz (IFF, CSIC, Spain)
12:30 pm	NEXT Collaboration	José Díaz (IFIC)

Lunch (1:00 pm – 3:30 pm)

S3 (3:30 pm – 5:00 pm)
Conveners: Octavio Valenzuela

Time	Title	Presenter
3:30 pm	The Construction of Quantum Field Operators: Something of Interest	Valeriy Dvoeglazov (Universidad de Zacatecas)
4:00 pm	Significant Effects of Nuclear Spallation Processes to the Big-Bang Nucleosynthesis	Sugai Kenichi (Saitama University)
4:30 pm	The Photon Dispersion as an Indicator of Non-Commutative Space-Time?	Wolfgang Bietenholz (ICN, UNAM)

Coffee Break (5:00 pm – 5:30 pm)

S4 (5:30 pm – 6:30 pm)
Conveners: Octavio Valenzuela

Time	Title	Presenter
5:30 pm		Lorenzo Díaz Cruz (Facultad de Ciencias Físico Matemáticas, BUAP)
6:00 pm	Dark Matter Candidates in Left-right Symmetric Models	Yu-Feng Zhou

		(Institute of Theotretical Physics, Chinese Academy of Sciences, P.R. China)
6:30 pm	HAWC	Alberto Carramiñana (INAOE)

Sunday 6/06

Trip to Teotihuacan. Time to leave: 6:15 am
We leave from the conference venue. The bus will be waiting us just outside the Arts and History building, where the conference is being held, near the parking space in San Francisco street.
For those who want to stay in Mexico city airport (or near that zone), the bus will stop there between 7:00-7:30 pm.
We return to Leon at 8:00 pm from Mexico airport in order to arrive around 1:00 am to the Arts and History department in Leon.

Speakers Abstracts

Tuesday, June 1st

Oleg Kamaev
University of Minnesota
Dark Matter Direct Detection Experiments (I)
A variety of experimental techniques are employed by direct detection dark matter experiments. These include solid-state detectors that measure the ionization and athermal phonons from particle interactions, high-purity Ge spectrometers, metastable bubble-chamber detectors, and time projection chambers. I will describe detection principles, operation, and results focusing on experiments with the best performance to date.

Ernest Ma
Riverside U.C.
Dark Left-Right Model: CDMS, LHC, ect..
The neutral partner of the charged lepton in an SU(2)_R doublet is proposed as a dark matter candidate (scotino). This model is naturally devoid of flavor-changing neutral currents and allows the Z' boson to be at around a TeV. Recent CDMS data suggest that it can be discovered at the LHC. Rare decays may also be enhanced.

Alejandro Ibarra
Technical University of Munich
TBA
"Cosmic-ray signatures of dark matter decay"
Astrophysical and cosmological observations do not require the dark matter particles to be absolutely stable. If they are indeed unstable, their decay into Standard Model particles might occur at a sufficiently large rate to allow the indirect detection of dark matter through an anomalous contribution to the high energy cosmic ray fluxes. In this talk we discuss the implications of the excess in the total electron plus positron flux and the positron fraction reported by the Fermi and PAMELA collaborations, respectively, for the scenario of decaying dark matter. We also discuss the constraints on this scenario from measurements of other cosmic ray species and the predictions for the diffuse gamma ray flux and the neutrino flux.

Jason Steffen
FERMILAB
The CHASE probe for chameleon Dark Energy
A scalar field is a favorite candidate for the particle responsible for dark energy. However, few theoretical means exist that can simultaneously explain the observed acceleration of the Universe and evade tests of gravity. The chameleon mechanism, whereby the properties of a particle depend upon the local environment, is one possible avenue. I present the status of the Chameleon Afterglow Search (CHASE) experiment, a laboratory probe for chameleon dark energy. CHASE marks a significant improvement other searches for chameleons both in terms of its sensitivity to the photon/chameleon coupling as well as its sensitivity to the classes of chameleon dark energy models and standard power-law models. Since chameleon dark energy is

virtually indistinguishable from a cosmological constant, CHASE tests dark energy models in a manner not accessible to astronomical surveys.

J. D. Vergados
CERN & Ioannina U.
Searching for Dark Matter: The Diurnal Variation in Directional Experiments
The recent WMAP data have confirmed that exotic dark matter together with the vacuum energy (cosmological constant) dominate in the flat Universe. Modern particle theories naturally provide viable cold dark matter candidates with masses in the GeV-TeV region. Supersymmetry provides the lightest supersymmetric particle (LSP), theories in extra dimensions supply the lightest Kaluza-Klein particle (LKP) etc. All such candidates will be called WIMPs (Weakly Interacting Massive Particles). The nature of dark matter can only be unraveled by its direct detection in the laboratory. Thus the direct dark matter search, which amounts to detecting the recoiling nucleus, following its collision with a
WIMP, is central to particle physics and cosmology. In this presentation we will theoretically explore the advantages of directional experiments, i.e. experiments in which, not only the energy but the direction of the recoiling nucleus is observed as well. Since the direction of observation is fixed with respect the earth, while the Earth is rotating around its axis, in a directional experiment the angle between the direction of observation and the Sun's direction of motion will change during the day. So, since the event rates sensitively depend on this angle, the observed signal in such experiments will exhibit very interesting and characteristic periodic diurnal variation.

Tonatiuh Matos
CINVESTAV
Scalar Field Dark Matter model
Scalar Field Dark Matter (SFDM) model remains as one of the best candidates to explain the nature of the Dark Matter of the Universe, because: 1.- The SFDM model has only one free parameter, the scalar field mass m_{SFDM}, 2.-The ultralight scalar field mass ($m_{SFDM} \sim 10^{-22}$eV) fits: the observed amount of substructure, the critical mass of galaxies, the rotation curves of galaxies, the central density profile of LSB galaxies, the evolution of the cosmological densities, etc. 3.- SFDM forms galaxies earlier than the Cold Dark Matter (CDM) model, because they condensate in Bose-Einstein Condensates at a critical temperature $T_c >> $TeV. So, if SFDM is right, we have to see big galaxies at big redshifts. In this talk we give a small review of the SFDM model and using very simple arguments we show that the quantum effects of an ultralight particle as the SFDM cannot be neglected at classical scales. We show that the effective density of this effect is constant in space and for such a mass, it is of the order of magnitude of the critical mass of the universe. Thus, we can interpret the effective density of this quantum effects as the cosmological constant.

Vincent Bertin
CPPM-Marseille
Indirect Search for Dark Matter with the ANTARES Neutrino Telescope
The ANTARES Collaboration is now operating the largest water Cherenkov neutrino telescope in the Nothern hemisphere. The apparatus, completed in May 2008,comprises 12 detection lines and a multidisciplinary instrumentation line installed at a depth of about 2500 m in the Mediterranean Sea offshore from France. The goals of ANTARES are among others the search for astrophysical neutrino point sources and for neutrinos produced in self-annihilation of dark matter particles. Likely sources of the latter type of neutrino emission would be the Sun and the Galactic Centre, where dark matter particles from the galactic halo are expected to accumulate. Prior to its completion, ANTARES has been taking data for more than a year in an intermediate setup with a five and a ten line detector configuration. First results on the search for dark matter annihilation in the Sun with the data recorded in 2007 and 2008 are presented, as well as sensitivity studies on Dark Matter searches with the full ANTARES detector
and the future large undersea cubic-kilometer neutrino telescope studied by the KM3NeT consortium.

Yamanaka Masato
Kyoto Sangyo University
New idea for charged lepton flavor violation search using a muonic atom.
Negative muon + electron -> electron + electron in a muonic atom for a quest of charged lepton flavor violation. The Coulomb attraction from the nucleus in a heavy muonic atom leads to significant enhancement in its rate, compared to positive muon electron -> electron positron. The upper limit of the branching ratio is estimated to be of the orders of O(10^{-17} - 10^{-18}) for the photonic and the four Fermi interactions from the present experimental constraints. The search for this process could serve complementarily with the other relevant processes to shed lights upon the nature of charged lepton flavor violation.

Keith Olive
University of Minnesota
Dark Matter in SuperGUT Unification Models

Jose A. R. Cembranos
University of Minnesota
Dark Matter from the UV completion of gravity
The modification of Einstein gravity at high energies is mandatory from a quantum approach. In this seminar, I will point out that this modification will necessarily introduce new degrees of freedom. I will analyze the possibility that these new gravitational states can provide the main contribution to the non-baryonic dark matter of the Universe. Unfortunately, the right ultraviolet completion of gravity is still unresolved. For this reason, I will illustrate this idea with the simplest high energy modification of the Einstein-Hilbert action: R^2-gravity.

Debasish Majumdar
Saha Institute of Nuclear Physics, Kolkata, India
Modulation of Dark Matter direct detection signals due to orbital (annual) and axial (diurnal) motion of the earth at recoil direction sensitive detectors
Direction sensitive direct detection of Weakly Interacting Massive Particles (WIMPs) as Dark matter would provide an unambiguous non-gravitational signature of Dark Matter (DM). The effect of modulation of DM signal due to earth's motion around the sun is small due to smaller velocity of earth (around 30 km/s) in comparison to solar velocity of about 220 km/s as which passes through the DM halo. The diurnal variation of DM signal due to earth's rotation around its own axis can be a significant signature of WIMP. Because of particular orientation of earth's axis of precision with respect to WIMP wind direction, the apparent direction of WIMP wind as observed at a detector can alter widely over a day (large rear-front asymmetry). Calculation of such variation needs to evaluate the projection (w.V) of WIMP velocity (V) on the direction of a recoil nucleus (w) after a possible DM - nucleus collision. The velocity of the WIMP with respect to the detector in a laboratory is to be determined by determining the velocity of sun relative to galactic centre, the velocity of centre of mass of earth relative to sun and the velocity of the laboratory relative to centre of mass of earth. The directions of all the components of the velocity are explicitly calculated in the present work for evaluating (w.V). The gas detectors like DRIFT (target material CS2), NEWAGE (target material CF4) etc. in a Time Projection Chamber (TPC) are expected to be capable of directional measurements of Dark Matter signal. In the present work diurnal variation of Dark Matter signal is studied in direction sensitive Dark Matter experiments like DRIFT and NEWAGE for different recoil directions (azimuthal and polar angle of the direction of recoiling nucleus with respect to the axes fixed to the laboratory) at different times of the year. We have chosen two types of Dark matter candidates for demonstrative purposes. They are Kaluza-Klein Dark Matter (lightest Kaluza-Klein particle or LKP) and the other candidate is from a scalar singlet extension of the Standard Model.

Wednesday, June 2nd

Christiane Frigerio Martins
Universidade Federal do ABC-São Paulo
A constant dark matter halo surface density in galaxies

Yann Mambrini
LPT Orsay
Gamma ray line generated by anomalies

Carmine Pagliarone
INFN, FNAL
Dark matter and collider physics

Qaisar Shafi
Bartol Research Inst. and Delaware U.
Realistic Inflation Models and Primordial Gravity Waves

Aldo Morselli
INFN Roma Tor Vergata
The Fermi Large area gamma ray Telescope and the current searches for dark matter in space
Since its launch in the 2008, the Large Area Telescope, onboard of the Fermi Gamma-ray Space Telescope, has detected the largest amount of gamma rays, in the 20MeV 300GeV energy range and electrons + positrons in the 7 GeV- 1 TeV range. This impressive statistics allows one to perform a very sensitive indirect experimental search for dark matter. I will present the latest results on these searches.

David G. Cerdeño
Universidad Autonoma de Madrid & Instituto de Fisica Teorica

Identification of Dark Matter particles with LHC and direct detection data
Accelerator searches for Dark Matter are particularly promising, but even if Weakly Interacting Massive Particles (WIMPs) are found at the Large Hadron Collider (LHC), it will be difficult to prove that they constitute the bulk of the DM in the Universe. A significantly better reconstruction of the DM properties can be obtained with a combined analysis of LHC and direct detection (DD) data, by making a simple Ansatz on the WIMP local density, i.e. by assuming that the local density scales with the cosmological relic abundance. This strategy allows to break degeneracies in the SUSY parameter space and achieve a significantly better reconstruction of the neutralino composition and its relic density than with LHC data alone.

Csaba Balazs
Monash University
Radio and gamma-ray constraints on dark matter annihilation in the Galactic center
I present upper limits on the dark matter self-annihilation cross section for scenarios in which annihilation leads to the production of electron-positron pairs. In our Galactic Centre (GC), relativistic electrons and positrons produce a radio flux via synchroton emission, and gamma ray flux via bremsstrahlung and inverse Compton scattering. On the basis of archival, interferometric and single-dish radio data, reently we have determined the radio spectrum of an elliptical region around the GC. We also considered gamma-ray data covering the same region from the EGRET instrument and from HESS. I show how the combination of these data can be used to place robust constraints on DM annihilation scenarios, in a way which is relatively insensitive to assumptions about the magnetic field strength in this region. Our results are approximately an order of magnitude more constraining than existing GC radio and gamma ray limits. For a dark matter mass of 10 GeV and an NFW profile, for example, we find that has to be less than few times 10^{-25} cm^3/s.

M.D. Rodríguez Frías
Grupo de Espacio y Astropartículas. Universidad de Alcalá
The Universe at the highest energies: The JEM-EUSO Space Mission.

Oleg Kamaev
University of Minnesota
Results from the Cryogenic Dark Matter Search experiment (II)
The Cryogenic Dark Matter Search (CDMS) experiment uses solid-state detectors operated near 40 mK to search for Weakly Interacting Massive Particles (WIMPs). The experiment measures the ionization and athermal phonons from particle interactions to discriminate candidate (nuclear recoil) from background (electron recoil) events with a rejection factor of better than 10^{6}. I will present results from the recent blind analysis of data from 612 kg days of raw exposure using the Ge detectors operated in the Soudan Underground Laboratory.

Axel de la Macorra
UNAM & IAC

Professor Magda Lola
Dept. of Physics, University of Patras, Greece
Gravitino Dark Matter and LHC Searches in R-violating supersymmetry
We study gravitino dark matter scenarios in supersymmetric theories with broken R-parity. It turns out that for the model parameters that may give rise to radiative neutrino masses and visible R-violating signatures at the LHC, gravitinos are cosmologically stable and can be good dark matter candidates. We also discuss the implications of these theories for photon, neutrino and charged particle spectra.

Mario E. Gomez
Universidad de Huelva
Lepton Flavor Violation Signals from GUT theories
A soft term structure as predicted by an Abelian flavour symmetry can result in large rates for charged LFV violating radiative decays. We present models where the RGEs for scales above M_{GUT} results to an efficient suppression of the ooff-diagonal terms in the scalar soft matrices. Finally, we explore the possibilities to observe LFV in charged lepton decays and stau decays at the LHC and LC.

Friday, June 4th

Luis Ureña
Universidad de Guanajuato
Unification models of inflation, dark matter and dark energy
We will discuss the main ideas about the possibility of unifying inflation, dark matter, and dark energy under

the evolution of a single field. The key point in the models is the transition from inflation to the Hot Big Bang, under which the inflaton survives to become later dark matter and dark energy. Some ideas about reheating and extra periods of inflation will be discussed in turn.

Azar Mustafayev
University of Minnesota
Testing the supersymmetric seesaw with leptogenesis
Within a supersymmetric type-I seesaw framework with flavor-blind universal boundary conditions, we study the consequences of imposing that the observed baryon asymmetry is explained by leptogenesis. We find that the parameter space is very constrained, allowing for specific predictions for lepton-flavor-violating rates accessible at current or future experiments.

Octavio Valenzuela
IA-UNAM
Dark Matter Distribution at Galactic and Sub-galactic Scales
The structure and abundance of galaxies have been extensively used to set constraints on dark matter halos properties as well as on the nature of dark matter candidates. Based on cosmological simulations of galaxy formation I will discuss the state of this constraints. Based on the same simulations I will give some attention to the consequences of the Milky Way structure on the local dark matter velocity distribution.

Carlos Muñoz
Madrid Autonoma U. & Madrid, IFT
A New Supersymmetric Standard Model and Gravitino Dark Matter
The $\mu\nu$SSM is a new supersymmetric standard model that solves the μ problem of the MSSM and explains neutrino data by simply using right-handed neutrinos. This solution implies the breaking of R-parity. We will review the model and analyze the possibility that the dark matter is made of gravitinos. Its possible detection will also be discussed.

T2K Collaboration
Vladimir Kravtsov
Colorado State University (USA)

Mirco Cannoni
Universidad de Huelva
Impact of internal bremsstrahlung on the detection of gamma-rays from neutralinos
We present a detailed study of the effect of internal bremsstrahlung photons in the context of the minimal supersymmetric standard models and their impact on gamma-ray dark matter annihilation searches. As an example, we review the gamma-ray dark matter detection prospects of the Draco dwarf spheroidal galaxy for the MAGIC stereoscopic system and the CTA project. Though the flux of high energy photons is enhanced by an order of magnitude in some regions of the parameter space, the expected fluxes are still much below the sensitivity of the instruments.

Vladimir Avila-Reese
Instituto de Astronomia, UNAM
"The dark and stellar mass assembling of galaxies as a probe of the LCDM cosmology"
A short review on how is that emerged the Lambda Cold Dark Matter (LCDM) cosmology will be presented, with special emphasis on its implications in galaxy formation and evolution. Following, resent results on the observational inferences of stellar mass assembly of galaxies will be confronted with LCDM-based models. While observations suggest that as the more massive is the galaxy, the earlier its stellar mass was assembled (downsizing), the models have troubles in explaining such a behavior, specially for low mass galaxies. New astrophysical ingredients should be introduced in the models but if they are not plausible, then LCDM will probably need a revision in favor of models like the Lambda Warm DM one.

Raul Hennings-Yeomans
Los Alamos National Laboratory
Direct Detection of Dark Matter with MiniCLEAN
Overwhelming astrophysical evidence indicates that non-baryonic Dark Matter constitutes most of the mass of the Universe. Nevertheless, the particle nature of Dark Matter remains a long standing mystery. The use of noble liquids as scintillators in single and dual-phase detectors are some of the most promising scalable WIMP detectors currently planned and under construction. The MiniCLEAN experiment will have 92 PMTs looking at a liquid Argon detector mass of over 500~kg in a single-phase configuration. It will use Pulse Shape Discrimination (PSD) techniques to search for low-energy WIMP nuclear recoils inside a fiducial volume. Liquid Argon would be interchangeable with liquid Neon to study A^2 dependence of a potential signal and examine backgrounds external to the cryogenic liquid. For the Argon run, MiniCLEAN projects a sensitivity in

terms of spin-independent WIMP-nucleon cross-section of 2$\times$10^{-45}cm^2 for a mass of 100~GeV/c^2. A status report of MiniCLEAN will be presented as well as plans to deploy the experiment at SNOLAB.

Mark Pipe
University of Sheffield
Spin Dependent Results from DRIFT
The DRIFT (Directional Recoil Identification From Tracks) collaboration operates a 1 m^3 scale negative ion TPC at the Boulby Mine in England. Recently this detector has been made sensitive to spin dependent WIMP interactions by operating with a 30 Torr CS2 - 10 Torr CF4 gas mixture. Results from this work will be presented. Results will also be presented from recent progress in reducing detector backgrounds.

Joe Sato
Saitama University
Measuring Lepton Flavour Violation at LHC with Long-Lived Slepton in the Coannihilation Region
When the mass difference between the lightest slepton, the NLSP, and the lightest neutralino, the LSP, is smaller than the tau mass, the lifetime of the lightest slepton increases in many orders of magnitude with respect to typical lifetimes of other supersymmetric particles. These small mass differences are possible in the MSSM and, for instance, they correspond to the coannihilation region of the CMSSM for $M_{½} \gsim 700$ GeV. In a general gravity-mediated MSSM, where the lightest supersymmetric particle is the neutralino, the lifetime of the lightest slepton is inversely proportional to the square of the intergenerational mixing in the slepton mass matrices. Such a long-lived slepton would produce a distinctive signature at LHC and a measurement of its lifetime would be relatively simple. Therefore, the long-lived slepton scenario offers an excellent opportunity to study lepton flavour violation at ATLAS and CMS detectors in the LHC and an improvement of the leptonic mass insertion bounds by more than five orders of magnitude would be possible.

James R. Boyce
Jefferson Lab
LIPSS Free-Electron Laser Searches for Dark Matter
A variety of Dark Matter particle candidates have been hypothesized by physics Beyond the Standard Model (BSM) in the very light (10-6 – 10-3 eV) range. In the past decade several international groups have conducted laboratory experiments designed to either produce such particles or extend the boundaries in parameter space. The LIght Pseudo-scalar and Scalar Search (LIPSS) Collaboration, using the “Light Shining through a Wall” (LSW) technique, passes the high average power photon beam from Jefferson Lab’s Free-Electron Laser through a magnetic field upstream from an optical beam dump. Light Neutral Bosons (LNBs), generated by coupling of photons with the magnetic field, pass through the beam dump (the wall) into an identical magnetic field where they revert to detectable photons by the same coupling process. While no evidence of LNBs was evident, new scalar coupling boundaries were established. New constraints were also determined for hypothetical para-photons and for milli-charged fermions. We will describe our experimental setup, results for LNBs, para-photons, and milli-charged fermions. Plans for a chameleon particle searches are underway. This work supported by the Office of Naval Research, the Joint Technology Office, the Commonwealth of Virginia, the Air Force Research Laborator

Mahmoud Wahba
Egyptian Center for Theoretical Physics, MTI
Viscous Cosmology
II will discuss the problem of bulk viscous cosmology as a suitable candidate model for inflation senario.

Marcus S. Cohen
New Mexico State University
The Spin(4,C) Ocean and its Currents: Dark Energy and Matter
The leptons, mesons, hadrons, and atoms emerge as J=1,2, 3, and 4 chiral pairs of quantized envelope modulations riding on a Spin(4,C)-homogeneous 8-spinor vacuum: an "ocean" of Dark Energy. The holonomies of their spin(4,C) phases are the electroweak, strong, and gravitational fields. Their invariant measures give particle mass ratios correct to 4%. But each localized pair of matter envelopes is surrounded by a "halo" of matter envelopes paired with vacuum spinors. Are these the Dark Matter?

Saturday, June 5th

Andrew Walcott Beckwith
American institute of Beam energy physics
Inquiry as to if higher dimensions can be used to unify DM and DE
Following the lead of a presentation the author gave in ACGRG5, in Christchurch, New Zealand, the author

wishes to present how using modification of the KK tower gravitons, a DM candidate, could with certain qualifications lead to gravitons as an artifact of DE giving re acceleration of the universe a billion years ago, through the deceleration parameter calculation. The effects of doing this sort of deceleration calculation would be a first order DM / DE joint model. The author concludes with a comparison of predictions which can be made via this model as contrasted with the modified DM / DE model given by U. Debnath, S. Chakrabory , Int. Journal of Theor. Phys. 47, No. 10, p 2663,(2008). which is a variant of a joint DM-DE chaplygin gas

Nassim Bozorgnia
UCLA
Channeling effects in direct dark matter detectors
The channeling of the ion recoiling after a collision with a WIMP changes the ionization signal in direct dark matter detection experiments, and it will produce a larger signal than otherwise expected. I will present estimates of the fraction of channeled recoiling ions in NaI (Tl) crystals and discuss channeling and blocking effects using analytic models produced in the 1960's and 70's.

Osamu Seto
Hokkai-Gakuen University
Higgs decay in Higgs portal dark matter models
In a scenario of Higgs portal dark matter, Higgs exchange processes are essential for both dark matter annihilation in the early Universe and direct search experiments. We study a scalar dark matter model with two Higgs doublets. We find that the possible maximal value for the branching ratio of the invisible decay of the Higgs boson can be significantly greater than that in the Higgs portal model with one Higgs doublet.

Octavio Obregón
DCI Universidad de Guanajuato

Gustavo Medina Tanco
ICN-UNAM
AUGER Collaboration

Pedro F. González Díaz
IFF, CSIC, Serrano 121, 28006 Madrid, Spain
Dark route to quantum gravity
Enter your abstract. Starting with a detailed review of a new quantum theory of special relativity which is based on taking into account the quantum entangled nature of the space-time structure of the current universe, we put forward some preliminary and rather fragmentary ideas on the similar quantization program for curved spaces describing gravitational systems. We have presented in this way the quantized space-time structure of Schwarzschild black holes, de Sitter space and some particular non simply connected solutions describing potentially causality-violating space-time tunnelings. We have seen that whereas these solutions keep showing their apparent horizons - if any, all their curvature singularities are canceled. Another remarkable result is that the thermal radiation processes uncovered in the semiclassical description of these space-times are preserved intact in the full quantized systems.

José Díaz
IFIC
NEXT Collaboration
NEXT is a recent collaboration which has as a goal to build a 100 kg TPC of enriched 136Xe in the form of high pressure gas to measure neutrinoless double beta decay. Electroluminiscence is the presently favored way of energy measurement, while tracking will be carried out either by Silicon PMT, APD or MicroMEGAS. NEXT will be installed in the Canfranc Underground Laboratory placed in the Somport road tunnel joining Spain and France.

Valeriy Dvoeglazov
Universidad de Zacatecas
The Construction of Quantum Field Operators: Something of Interest
We draw attention to some tune problems in constructions of the quantum-field operators for spin ½ and 1. They are related to the existence of negative-energy and acausal solutions of relativistic wave equations. Particular attention is paid to the chiral theories, and to the method of the Lorentz boosts.

Sugai Kenichi
Saitama University
Significant effects of nuclear spallation processes to the Big-Bang nucleosynthesis
We investigate the effects of nuclear spallation processes to the Big-Bang nucleosynthesis (BBN) induced by long lived charged massive particle(CHAMP). The long lived CHAMP forms a bound state with nuclei in the BBN era, and provides exotic nuclear reactions. We study those and recalculate the light elements

abundances. In particular, we address the lithium7 problem, which is inconsistency between observed lithium7 primodial abundance and predicted one. Imposing the consistency between them, we predict the nature of long lived CHAMP.

Wolfgang Bietenholz
INC, UNAM (Mexico)
The Photon Dispersion as an Indicator of Non-Commutative Space-Time ?
We first review the status of the search for a deviation from the linear photon dispersion relation, in particular by monitoring cosmic photons from gamma ray bursts or blazar flares. Then we discuss theoretical concepts that could lead to such a deviation, as a manifestation of Lorentz invariance violation. In particular we present a numerical study of pure U(1) gauge theory in a 4d non-commutative space. Starting from a finite lattice, we explore the phase diagram and its extrapolation to the continuum and infinite volume. These simultaneous limits lead to a phase of broken Poincare symmetry, where photons appears to be IR stable, despite the perturbatively negative IR singularity. We evaluate the corresponding photon dispersion relation explicitly.

Lorenzo Díaz Cruz
Facultad de Ciencias Físico Matemáticas BUAP

Yu-Feng Zhou
Institute of Theotretical Physics, Chinese Academy of Sciences, P.R. China
Dark matter candidates in left-right symmetric models
We explore dark matter (DM) scenarios in extensions of left-right symmetric models with a gauge-singlet scalar field. The gauge-singlet scalar can automatically become a DM candidate, if both P and CP symmetries are only broken spontaneously. Thus no extra discrete symmetries are needed to make the DM candidate stable. After constraining the model parameters from the observed relic DM density, predictions for direct detection experiments is made. We show that for some parameter space, the predicted WIMP-nucleon elastic scattering cross section can reach the current experimental upper bound, which can be tested by the experiments in the future.

Alberto Carramiñana
INAOE
HAWC

POSTER SESSION

Tuesday, June 1st

Dibyendu Panigrahi
Kandi Raj College, Kandi, Murshidabad, INDIA-742137
Accelerating Universe in Higher Dimensional Space Time
We find exact solutions in five dimensional inhomogeneous matter dominated model with a varying cosmological constant. Adjusting arbitrary constants of integration one can also achieve acceleration in our model. Aside from an initial singularity our spacetime is regular everywhere including the centre of the inhomogeneous distribution. We also study the analogous homogeneous universe in (4+d) dimensions. Here an initially decelerating model is found to give late acceleration in conformity with the current observational demands. We also find that both anisotropy and number of dimensions have a role to play in determining the time of flip, in fact the flip is delayed in multidimensional models. Some astrophysical parameters like the age, luminosity distance etc are also calculated and the influence of extra dimensions is briefly discussed. Interestingly our model yields a larger age of the universe compared to many other quintessential models.

Reyna Xoxocotzi
BUAP
Indirect Detection of Dark Matter with HAWC
We are interested in studying signals of Dark Matter using Cerenkov detectors. A minimalistic approach is explored: the so called Minimal Dark Matter (MDM). In this approach a few multiplets can be added to the Standard Model that contains a lightest neutral component. It is automatically stable and provides a viable Dark Matter candidate. Indirect detection of some MDM candidates could be pursued at the proposed High Altitude Water Cerenkov (HAWC) experiment. We focus on the reaction of DM annihilation into photon pairs. By studying astrophysical sources of gamma rays, HAWC will add data to other experiments that search for Indirect Detection of Dark Matter.

Lilian Prado Gonzalez

BUAP, FCFM

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Esteban Alejandro Reyes Pérez Montañez

Instituto de Física, UNAM

Toroidal Dipole Moment of the Neutralino in the MSSM

In order to characterize one of the most favored candidates for dark matter, we calculate the toroidal dipole moment of the neutralino in the Minimal Supersymmetric Standard Model at the one-loop level. As a Majorana fermion, the neutralino only shows this electromagnetic property, which we intend to relate to cosmology and astrophisics.

Mario A. Acero Ortega

ICN - UNAM

Earth matter effect on active-sterile neutrino oscillations

Oscillations between active and sterile neutrinos remain as an open possibility to explain some experimental observations. In a four-neutrino mixing framework, we use the Magnus expansion of the evolution operator in order to study the propagation of neutrinos through the Earth. We apply this formalism to calculate the transition probabilities from active to sterile neutrinos taking into account the matter effect for a varying terrestrial density.

Alma Xochitl Gonzalez Morales

Instituto de Ciencias Nucleares, UNAM

The mass power spectrum at Galactic and subgalactic scales as a constraint to dark matter properties

Currently the most successful cosmological model is the Lambda cold dark matter model. It is well known that cold dark matter candidates, like Neutralino, Axion, etc., predict the existence of many substructure at galactic and sub galactic scales, that is the mass power spectrum (PS) extends to very low scales. This substructure has not been detected in a irrefutable way. There are other DM candidates as is the case of Warm Dark Matter, Scalar Field Dark Matter, particles that interacts with other species, that predict a PS cut off at low masses depending on the particle properties. We explore if the PS cut off mass scale can be constrained by the Solar System dynamics, by the circular velocity function of low mass galaxies, and by the 21 cm power spectrum. These potential constraints in the mass power spectrum are potentially also constraints for the dark matter properties

René Ángeles Martínez

Departamento de Fisica, del DCI de la Universidad de Guanajuato

Gauge Transformations as Spacetime Symmetries.

Weinberg has shown that massless fields of helicity ±1 do not transform homogeneously under Unitary Lorentz Transformations. Using Weinberg's field for the photon and the Dirac field for the fermions we propose the implementation of a spacetime symmetry in the Lagrangian to fix the interaction of these particles. The interaction obtained is the minimal coupling, i.e. the same interaction obtained conventionality from the U(1) gauge principle.

Dupret Alberto Santana Bejarano

Universidad de Sonora Departamento de Investigacion en Fisica.

Building DM Haloes

We review the necessary conditions for building stable isolated N-body systems that follow "cuspy" nfw-like profiles, and construct the necessary code for building this type of equilibrium system.

Alma D. Rojas Pacheco

FCFM-BUAP

Higher-dimensional Higgs representations in SUSY-GUT models

Supersymmetric Grand Unified Theories have achieved some degree of succes, already present in the minimal models (with SU(5) or SO(10)). However, there are open problems that suggest the need to incorporate more elaborate constructions, specifically the use of higher-dimensional representations in the Higgs sector. For example, a 45 representation of SU(5) is often included to obtain correct mass relations for the first and second families of d-type quarks and leptons. When one adds these higher-dimensional Higgs representations one must verify the cancellation of anomalies associated to their fermionic partners. One possible choice, free

of anomalies, include both representations $45+\bar{45}$ to cancel anomalies. We review the necessary conditions for the cancellation of anomalies and discuss the different possibilities for supersymmetric SU(5) models. Alternative anomaly-free combinations of Higgs representations, beyond the usual vectorlike choice, are identified, and it is shown that their corresponding β functions are not equivalent. Although the unification of gauge couplings is not affected, the introduction of multidimensional representations leads to different scenarios for the perturbative validity of the theory up to the Planck scale.

Luis Rey Díaz Barrón
División de Ciencias e Ingenierías, UG
Non-conmutative quantum cosmology with scalar field

Susana Valdez Alvarado
División de Ciencias e Ingenierías, Campus León
Phi^4 Oscillatons are non-singular and asymptotically flat solution for the Einstein-Klein-Gordon system of equations with spherical symmetry for the case of the real scalar field, in which the scalar field and the metric are fully time-dependent. In the work done for Miguel Alcubierre et. al., show that oscillatons are classified into stable (S-branch) and unstable (U-branch) case.In this work we present an analysis of the numerical evolution of EKG equation for the scalar field endowed with a quartic self-interaction potential. We will use different values of the parameter that accompanies the quartic term of the potential for the results that we will show.

Mónica Felipa Ramírez Palacios
Francisco José de Anda Navarro
University of Guadalajara
Electroweak scale neutrinos and decaying dark matter
We explore the scalar phenomenology of a model of electroweak scale neutrinos that incorporates the presence of a lepton number violating singlet scalar. An analysis of the pseudoscalar-Majoron field associated to this singlet field is carried out in order to verify the viability of the model and to restrict its parameter space. In particular we study the Majoron decay $J \to \nu \nu$ and use the bounds on the Majoron mass and width obtained in a modified Majoron Decaying Dark Matter scenario.

Vannia González Macías
DCI-UG
Probing Majorana neutrino CP phases and masses in neutrino-antineutrino conversion
We propose a new strategy for detecting the CP-violating phases and the effective mass of muon Majorana neutrinos by measuring observables associated with neutrino-antineutrino oscillations in pion± decays. Within the generic framework of quantum field theory, we compute the non-factorizable probability for producing a pair of same-charged muons in pion± decays as a distinctive signature of muon neutrino- muon antineutrino oscillations. We show that an intense neutrino beam through a long baseline experiment is favored for probing the Majorana phases. Using the neutrino-antineutrino oscillation probability reported by MINOS collaboration, a new stringent bound on the effective muon-neutrino mass is derived.

Selim Gómez Ávila
DCI-UG
Quantum field theory in 4+1 dimensions
We explore some interesting properties of a QFT formulated à la Weinberg in a 4+1 dimensional flat spacetime. In particular we focus on new quantum numbers coming from the invariant operators coming from the 5D Poincaré algebra.

Carlos Vaquera Araujo
DCI-UG
Longitudinal gauge boson scattering in left-right symmetric models
In this work, low energy theorems for longitudinal modes of the gauge bosons contained in the $SU(2)_L\times SU(2)_R\times U(1)_{B-L}$ electroweak gauge theory are derived. These theorems are valid for energies in the domain of applicability of the Equivalence Theorem, and hold for all left-right symmetric models assuming that there are no extra contributions from light scalars to the scattering amplitudes.