42nd SLAC Summer Institute

Report of Contributions

Contribution ID: **0** Type: **not specified**

Cosmology Basics (I)

Monday, 4 August 2014 10:30 (1 hour)

Presenter: Dr DODELSON, Scott (fermilab)

Session Classification: Lectures

Contribution ID: **1** Type: **not specified**

Dark Matter and Why We Believe in it ?

Monday, 4 August 2014 09:00 (1 hour)

Presenter: FINKBEINER, Douglas (Harvard University)

Session Classification: Lectures

Contribution ID: **2** Type: **not specified**

Cosmology Basics (II)

Monday, 4 August 2014 11:45 (1 hour)

Presenter: Dr DODELSON, Scott (fermilab)

Session Classification: Lectures

Contribution ID: **3** Type: **not specified**

Cosmology Basics (III)

Tuesday, 5 August 2014 09:00 (1 hour)

Presenter: Dr DODELSON, Scott (fermilab)

Session Classification: Lectures

Contribution ID: **4** Type: **not specified**

Particle Dark Matter (I)

Tuesday, 5 August 2014 10:30 (1 hour)

Presenter: ZUREK, Kathryn (University of Michigan)

Session Classification: Lectures

Contribution ID: **5** Type: **not specified**

Search for Dark Matter at the LHC (I)

Tuesday, 5 August 2014 11:45 (1 hour)

Presenter: WHITESON, Daniel (University of California Irvine (US))

Session Classification: Lectures

Contribution ID: **6** Type: **not specified**

Particle Dark Matter (II)

Wednesday, 6 August 2014 09:00 (1 hour)

Presenter: ZUREK, Kathryn (University of Michigan)

Session Classification: Lectures

Contribution ID: **7** Type: **not specified**

Particle Dark Matter (III)

Wednesday, 6 August 2014 11:45 (1 hour)

Presenter: ZUREK, Kathryn (University of Michigan)

Session Classification: Lectures

Contribution ID: **8** Type: **not specified**

Search for Dark Matter at the LHC (II)

Wednesday, 6 August 2014 10:30 (1 hour)

Presenter: WHITESON, Daniel (University of California Irvine (US))

Session Classification: Lectures

Contribution ID: **9** Type: **not specified**

Structure Formation (I)

Thursday, 7 August 2014 09:00 (1 hour)

Presenter: Prof. ABEL, Tom (SLAC)

Session Classification: Lectures

Contribution ID: **10** Type: **not specified**

Astrophysical Constraints on Dark Matter (I)

Thursday, 7 August 2014 10:30 (1 hour)

Presenter: STRIGARI, Louis (Indianna University)

Session Classification: Lectures

Contribution ID: **11** Type: **not specified**

Direct Detection of Dark Matter: Overview

Thursday, 7 August 2014 11:45 (1 hour)

Presenter: Prof. AKERIB, Dan (SLAC)

Session Classification: Lectures

Contribution ID: **12** Type: **not specified**

Structure Formation (II)

Friday, 8 August 2014 09:00 (1 hour)

Presenter: Prof. ABEL, Tom (SLAC)

Session Classification: Lectures

Contribution ID: **13** Type: **not specified**

Astrophysical Constraints on Dark Matter (II)

Friday, 8 August 2014 10:30 (1 hour)

Presenter: STRIGARI, Louis (Indiana University)

Session Classification: Lectures

Contribution ID: **14** Type: **not specified**

Direct Detection of Dark Matter: Noble Liquid

Friday, 8 August 2014 11:45 (1 hour)

Presenter: Prof. AKERIB, Dan (SLAC)

Session Classification: Lectures

Contribution ID: **15** Type: **not specified**

Lensing Constraints on Dark Matter (I)

Monday, 11 August 2014 09:00 (1 hour)

Presenter: VEGETTI, Simona (MPA Garching)

Session Classification: Lectures

Contribution ID: **16** Type: **not specified**

Direct Detection of Dark Matter: Solid State

Monday, 11 August 2014 10:30 (1 hour)

Presenter: CUSHMAN, Priscilla (University of Minnesota)

Session Classification: Lectures

Contribution ID: **17** Type: **not specified**

Indirect Detection of Dark Matter (I)

Monday, 11 August 2014 11:45 (1 hour)

Presenter: SIEGAL-GASKINS, Jennifer (Caltech)

Session Classification: Lectures

Contribution ID: **18** Type: **not specified**

Lensing Constraints on Dark Matter (II)

Tuesday, 12 August 2014 09:00 (1 hour)

Presenter: VEGETTI, Simona (MPA Garching)

Session Classification: Lectures

Contribution ID: **19** Type: **not specified**

Direct Detection of Dark Matter: Low Background Techniques

Tuesday, 12 August 2014 10:30 (1 hour)

Presenter: CUSHMAN, Priscilla (University of Minnesota)

Session Classification: Lectures

Contribution ID: **20** Type: **not specified**

Indirect Detection of Dark Matter (II)

Tuesday, 12 August 2014 11:45 (1 hour)

Presenter: SIEGAL-GASKINS, Jennifer (Caltech)

Session Classification: Lectures

Contribution ID: **21** Type: **not specified**

Dark Matter in the CMB

Wednesday, 13 August 2014 09:00 (1 hour)

Presenter: SLATYER, Tracy (MIT)

Session Classification: Lectures

Contribution ID: **22** Type: **not specified**

Axions: Theory

Wednesday, 13 August 2014 10:30 (1 hour)

Presenter: DINE, Michael (UC Santa Cruz)

Session Classification: Lectures

Contribution ID: **23** Type: **not specified**

Axions: Experiments

Wednesday, 13 August 2014 11:45 (1 hour)

Presenter: ROSENBERG, Leslie (University of Washington)

Session Classification: Lectures

Contribution ID: **24** Type: **not specified**

Dark Matter in the Milky Way

Thursday, 14 August 2014 09:00 (1 hour)

Presenter: BOVY, Jo (IAS)

Session Classification: Lectures

Contribution ID: **25** Type: **not specified**

Dark Sectors

Thursday, 14 August 2014 10:30 (1 hour)

Presenter: TORO, Natalia (Perimeter Institute for Theoretical Physics)

Session Classification: Lectures

Contribution ID: **26** Type: **not specified**

Dark Photon Searches

Thursday, 14 August 2014 11:45 (1 hour)

Presenter: GRAHAM, Mathew (SLAC)

Session Classification: Lectures

Contribution ID: **27** Type: **not specified**

Dark Matter in Galaxy Clusters

Friday, 15 August 2014 09:00 (1 hour)

Presenter: BRADAC, Marusa (UC Davis)

Session Classification: Lectures

Contribution ID: **28** Type: **not specified**

Complementarity of Dark Matter

Friday, 15 August 2014 10:30 (1 hour)

Presenter: TAIT, Tim (University of California, Irvine)

Session Classification: Lectures

Contribution ID: **29** Type: **not specified**

The Road Ahead

Friday, 15 August 2014 11:45 (1 hour)

Presenter: WEINER, Neal (NYU)

Session Classification: Lectures

Contribution ID: **30** Type: **not specified**

Q & A

Tuesday, 12 August 2014 14:45 (1h 15m)

Session Classification: Discussions

Contribution ID: **31** Type: **not specified**

Projects

Tuesday, 12 August 2014 16:30 (1h 15m)

Session Classification: Discussions

Contribution ID: **32** Type: **not specified**

Q & A

Contribution ID: **33** Type: **not specified**

Q & A

Contribution ID: **34** Type: **not specified**

Project work

Thursday, 7 August 2014 16:30 (1h 15m)

Session Classification: Discussions

Contribution ID: **35** Type: **not specified**

Q & A

Thursday, 7 August 2014 14:45 (1h 15m)

Session Classification: Discussions

Contribution ID: **36** Type: **not specified**

Scientific Education: K-12

Presenter: QUINN, Helen (SLAC)

Contribution ID: **37** Type: **not specified**

How to Write about Science

Presenter: TUTTLE, Kelen (SLAC)

Contribution ID: **38** Type: **not specified**

How to perform outreach for an experiment

Presenter: BARNETT, Michael (Lawrence Berkeley National Lab. (US))

Contribution ID: **39** Type: **not specified**

How to Produce a Scientific Documentary

Presenter: LUND, Tony (Revelations Entertainment)

Contribution ID: **40** Type: **not specified**

Results from Planck

Presenter: MILLEA, Marius (UC Davis)

Contribution ID: **41** Type: **not specified**

Results from Fermi

Presenter: WOOD, Matthew (SLAC)

Contribution ID: **42** Type: **not specified**

Results from CDMS

Presenter: SERFASS, Bruno

Contribution ID: **43** Type: **not specified**

Complementarity of Dark Matter Searches

Presenter: ISMAIL, Ahmed (SLAC National Accelerator Laboratory)

Contribution ID: **44** Type: **not specified**

Results from LHCb

Presenter: GRAUGES POUS, Eugeni (University of Barcelona (ES))

Contribution ID: **45** Type: **not specified**

Results from the B-factories

Presenter: ANULLI, Fabio (Universita e INFN, Roma I (IT))

Contribution ID: **46** Type: **not specified**

Results from T2K

Presenter: DI LUISE, Silvestro (Eidgenoessische Tech. Hochschule Zuerich (CH))

Contribution ID: **47** Type: **not specified**

Reactor Measurements of Theta_13

Presenter: TERAO, Kazuhiro (Columbia University)

Contribution ID: **48** Type: **not specified**

Results from IceCube

Presenter: HA, Chang Hyon (LBNL)

Contribution ID: **49** Type: **not specified**

Team 1a: Direct detection below neutrino floor

Thursday, 14 August 2014 14:00 (18 minutes)

Presenter: DAVIS, Adam (University of Cincinnati (US))

Session Classification: Project Presentations

Contribution ID: **50** Type: **not specified**

CF1: 8 GeV WIMP DM

Presenter: KOBACH, Andrew (Northwestern University)

Contribution ID: **51** Type: **not specified**

Team 13: Maximum mass of DM particle

Thursday, 14 August 2014 16:24 (18 minutes)

Presenters: MARTIN, Elwin (UCLA); JAY, William (University of Colorado)

Session Classification: Project Presentations

Contribution ID: **52** Type: **not specified**

EF1: 4th generation b’

Presenter: BESJES, Geert Jan (Radboud University Nijmegen (NL))

Contribution ID: **53** Type: **not specified**

IF1: on/off-axis neutrino for Mass Hierarchy/CPV

Contribution ID: **54** Type: **not specified**

Results from the Tevatron

Presenter: SCHWIENHORST, Reinhard (Michigan State University (US))

Contribution ID: **55** Type: **not specified**

Recent Results from ATLAS

Presenter: NIELSEN, Jason (University of California,Santa Cruz (US))

Contribution ID: **56** Type: **not specified**

Recent Results from CMS

Presenter: LANNON, Kevin Patrick (University of Notre Dame (US))

Contribution ID: **57** Type: **not specified**

Q & A

Tuesday, 5 August 2014 14:45 (1h 15m)

Session Classification: Discussions

Contribution ID: **58** Type: **not specified**

Project kick-off

Tuesday, 5 August 2014 16:30 (1h 15m)

Session Classification: Discussions

Contribution ID: **60** Type: **not specified**

Soccer

Wednesday, 13 August 2014 17:30 (1h 30m)

Contribution ID: **62** Type: **not specified**

A search for indirect cosmological evolution of dark matter

We propose a scenario of creation of dark matter from a decaying cosmological constant. Arc-like pattern found on the Cosmic Microwave Background Radiation (CMBR) were shown to result from the dark matter particles in the Q-phase of the interacting cosmological constant (ICC) model. In the present work, an investigation is made into how the corresponding decay of such dark matter particles might influence these signatures, in view of the recent data from PLANCK and the diffuse glow of the anomalous microwave radiation. We also discuss the constraints on such decay imposed by the interaction of the cosmological constant with the background. In this way, we believe that the CMBR pattern must be a highly significant tool to study the dark matter evolution indirectly. The predictions made in the ICC model can be verified in the concordance space of multiple observations.

Summary

We propose a scenario of creation of dark matter from a decaying cosmological constant. Arc-like pattern found on the Cosmic Microwave Background Radiation (CMBR) were shown to result from the dark matter particles in the Q-phase of the interacting cosmological constant (ICC) model. In the present work, an investigation is made into how the corresponding decay of such dark matter particles might influence these signatures, in view of the recent data from PLANCK and the diffuse glow of the anomalous microwave radiation. We also discuss the constraints on such decay imposed by the interaction of the cosmological constant with the background. In this way, we believe that the CMBR pattern must be a highly significant tool to study the dark matter evolution indirectly. The predictions made in the ICC model can be verified in the concordance space of multiple observations.

Primary author: Dr VERMA, Murli (LUCKNOW UNIVERSITY)

Presenter: Dr VERMA, Murli (LUCKNOW UNIVERSITY)

Contribution ID: **63** Type: **not specified**

A Model of Partially Interacting Dark Matter

We present a microscopic model of partially interacting dark matter.

Primary author: LORSHBOUGH, Dustin (U)

Presenter: LORSHBOUGH, Dustin (U)

Contribution ID: **64** Type: **not specified**

Cosmic Ray Excesses from Multi-component Dark Matter Decays

AMS-02 collaboration published their measurement on the positron fraction in the cosmic rays, confirming the excesses by PAMELA. Also, the Fermi-LAT data on the total $e^+ + e^-$ flux also showed excess above 20 GeV. In this talk, I shall show that the multi-component decaying dark matter (DM) scenario can naturally explain these two anomalies. By performing the ^{2} fits, we find that two DM components are already enough to give a reasonable fit of both AMS-02 and Fermi-LAT data. As a byproduct, the fine structure around 100 GeV observed by AMS-02 and Fermi-LAT can be naturally explained by the dropping due to the lighter DM component. With the obtained model parameters by the fitting, we calculate the diffuse γ-ray emission spectrum in this two-component DM scenario, and find that it is consistent with the data measured by Fermi-LAT. Finally, a microscopic particle DM model is constructed to naturally realize the two-component DM scenario, which points out an interesting neutrino signal which is possible to be measured in the near future by IceCube.

Primary authors: Prof. GENG, Chao-Qiang (National Tsing Hua University); HUANG, Da (N); Dr TSAI, Lu-Hsing (National Tsing Hua University)

Presenter: HUANG, Da (N)

Contribution ID: **65** Type: **not specified**

Prospects for testing models of coupled dark matter-dark energy via 21 cm Power Spectrum after Reionization

The hydrogen 21 cm line has been used as an interesting tool of cosmology, and among its several applications there is the possibility of testing models of modified gravity via comparing both modified gravity and Λ-CDM 21 cm Power Spectrum. The present work goes in the same direction, aiming to study models of interation between dark energy and dark matter using this approach. The basic concepts of 21 cm line and its related PS will be presented, with the purpose of comparing the 21 cm PS after reionization from coupled dark matter-dark energy with that one from Λ-CDM.

Primary author: LANDIM, Ricardo (University of Sao Paulo)

Co-author: Prof. ABDALLA, Elcio (University of Sao Paulo)

Presenter: LANDIM, Ricardo (University of Sao Paulo)

Contribution ID: **66** Type: **not specified**

H.E.S.S. Analysis of Sgr A*

The mysterious Galactic Center is an interesting region with frequent flaring activities from the radio to X-ray bands. However, VHE flux always remains steady. In 2012, a gas cloud G2 was discovered to be travelling straight to the GC. It is expected to pass the pericenter in 2014. During pericenter passage, it will be so closed to the GC that it will be completely disintegrated by the black hole. VHE flaring activities are expected. In this talk, I am going to present the results of our analysis of the GC using HESS.

Summary

So far, there has been no variability. G2 is passing the pericenter this year. We continue to monitor it to search for variability.

Primary author: Ms POON, Helen (Max Planck Insitut fur Kernphysik)

Co-authors: Dr BRUN, Francois (CEA Saclay); Dr CHAKRABORTY, Nachiketa (Max Planck Institut fur Kernphysik)

Presenter: Ms POON, Helen (Max Planck Insitut fur Kernphysik)

Contribution ID: **67** Type: **not specified**

Role of electroweak radiation in predictions for dark matter indirect detection

A very exciting challenge in particle and astroparticle physics is the exploration of the nature of dark matter. The striking evidences of the existence of dark matter
are also the strongest phenomenological indications for physics beyond the Standard Model.
A huge experimental effort is currently made at colliders and via astrophysical experiments to shed light on the nature of dark matter.
More specifically dark matter may be produced at colliders or detected through direct and indirect detection experiments.
The interplay and complementarity between these different approaches and techniques offers extraordinary opportunities to improve our understanding of
the nature of dark matter or to set constraints on dark matter models.

In indirect detection, in particular, one searches for dark matter annihilation products, that produce secondary antimatter particles like positrons and antiprotons.
Such antimatter particles propagate through the Galaxy and can eventually be detected at Earth by astrophysical experiments.

A particularly interesting point is the importance of electroweak (EW) corrections to the predictions for the expected fluxes at Earth.
The inclusion of EW radiation from the primary dark matter
annihilation products can actually significantly affect the spectra of the secondary SM particles.
The EW radiation can be described using fragmentation functions, as done for instance in QCD.
We study the quality of this approximation in a simplified supersymmetric model and in a Universal Extra Dimension model.

Primary authors: ALI CAVASONZA, Leila (RWTH-Aachen); PELLEN, Mathieu (RWTH Aachen); Prof. KRAEMER, Michael (RWTH Aachen)

Presenter: ALI CAVASONZA, Leila (RWTH-Aachen)

Contribution ID: **68** Type: **not specified**

Non-Existence of Black Holes with Non-Canonical Scalar Fields

In this talk we'll study the existence of black holes with non-canonical scalar fields as matter source and prove a simple no-hair theorem which rules out the existence of stationary, asymptotically flat black holes possessing scalar hair for a wide class of such models. This applies in particular to K-essence theories like the ghost condensate model, and large sectors of the dilatonic ghost condensate and Dirac-Born-Infeld models.

Primary author: Mr JHA, Rahul (DAMTP, University of Cambridge)

Co-author: Mr GRAHAM, Alexander (DAMTP, University of Cambridge)

Presenter: Mr JHA, Rahul (DAMTP, University of Cambridge)

Track Classification: Aug/6

Contribution ID: **69** Type: **not specified**

Improving Fermi-LAT Angular Resolution with CTBCORE

The Large Area Telescope on the *Fermi* Gamma-ray Space Telescope has a point spread function with large tails, consisting of events affected by tracker inefficiencies, inactive volumes, and hard scattering; these tails can make source confusion a limiting factor. The parameter CTBCORE, available in the publicly available Extended *Fermi* LAT data, estimates the quality of each event's direction reconstruction; by implementing a cut in this parameter, the tails of the point spread function can be suppressed at the cost of losing effective area. We implement cuts on CTBCORE and present updated instrument response functions derived from the *Fermi* LAT data itself, along with all-sky maps generated with these cuts. Having shown the effectiveness of these cuts, especially at low energies, we encourage their use in analyses where angular resolution is more important than Poisson noise.

Primary author: PORTILLO, Stephen (Harvard University)

Co-author: FINKBEINER, Douglas (Harvard University)

Presenter: PORTILLO, Stephen (Harvard University)

Track Classification: Aug/6

Contribution ID: **70** Type: **not specified**

Spin-One Top Partner: Phenomenology

Cai, Cheng, and Terning (CCT) suggested a model in which the left-handed top quark is identified with a gaugino of an extended gauge group, and its superpartner is a spin-1 particle. We perform a phenomenological analysis of this model, with a focus on the spin-1 top partner, which we dub the **swan**. We find that precision electroweak fits, together with direct searches for Z' bosons at the LHC, place a lower bound of at least about 4.5 TeV on the swan mass. An even stronger bound, 10 TeV or above, applies in most of the parameter space, mainly due to the fact that the swan is typically predicted to be significantly heavier than the Z'. We find that the 125 GeV Higgs can be easily accommodated in this model with non-decoupling D-terms. In spite of the strong lower bound on the swan mass, we find that corrections to Higgs couplings to photons and gluons induced by swan loops are potentially observable at future Higgs factories. We also briefly discuss the prospects for discovering a
swan at the proposed 100 TeV pp collider.

Primary author: PERELSTEIN, Maxim (Cornell University)

Co-authors: JAIN, Bithika (Syracuse University); COLLINS, Jack H. (Cornell University); REY-LE LORIER, Nicolas (Cornell University)

Presenter: JAIN, Bithika (Syracuse University)

Track Classification: Aug/6

Contribution ID: **71** Type: **not specified**

Redshift space distortions and interacting dark sector models

We have proposed cosmological scenarios with interaction in the dark sector as a means of alleviating the coincidence problem. Now we want to test the validity of our models and constrain their parameters through recent observational data such as Planck Collaboration, $H(z)$, supernovae and Redshift Space Distortions. Here we present a brief review of the linear theory of redshift space distortions and their related observables for cosmology.

Primary author: MARCONDES, Rafael (u)

Presenter: MARCONDES, Rafael (u)

Track Classification: Aug/12

Contribution ID: **72** Type: **not specified**

Search for new phenomena in dijet distributions using pp collision data at centre-of-mass energy 8 TeV with the ATLAS detector

The dijet final state at high transverse momentum probes the highest energies reached in a collider experiment. This corresponds to the largest reach in mass for the production of new particles, but also to resolving the smallest distances. Several phenomena described by models of physics beyond the Standard Model could be seen in the angular and mass distributions of dijets. This poster shows recent results at $\sqrt{s} = 8$ TeV, using data with an integrated luminosity of 20.3 fb^{-1}, collected by the ATLAS detector.

Primary author: BRYNGEMARK, Lene (Lund University (SE))

Presenter: BRYNGEMARK, Lene (Lund University (SE))

Track Classification: Aug/12

Contribution ID: **73** Type: **not specified**

Results from EXO

Monday, 4 August 2014 14:45 (30 minutes)

Presenter: OSTROVSKIY, Igor (Stanford University)

Session Classification: Topical Conference I

Contribution ID: **74** Type: **not specified**

Results from T2K

Monday, 4 August 2014 15:15 (30 minutes)

Presenter: Prof. ZIMMERMAN, Eric D. (University of Colorado)

Session Classification: Topical Conference I

Contribution ID: **75** Type: **not specified**

Results from LHCb

Monday, 4 August 2014 16:05 (30 minutes)

Presenter: CHARLES, Matthew John (Centre National de la Recherche Scientifique (FR))

Session Classification: Topical Conference I

Contribution ID: **76** Type: **not specified**

Searches for Dark Matter and Other Results from the B-Factories

Monday, 4 August 2014 16:35 (30 minutes)

Presenter: PORTER, Frank (Caltech)

Session Classification: Topical Conference I

Contribution ID: **77** Type: **not specified**

Physics of the Higgs Boson at the LHC

Wednesday, 6 August 2014 14:45 (30 minutes)

Presenter: OLSEN, Jim (Princeton University (US))

Session Classification: Topical Conference II

Contribution ID: **78** Type: **not specified**

Searching for Physics Beyond the Standard Model at the LHC

Wednesday, 6 August 2014 15:15 (30 minutes)

Presenter: COOKE, Mark Stephen (Lawrence Berkeley National Lab. (US))

Session Classification: Topical Conference II

Contribution ID: **79** Type: **not specified**

Directional Detection of Dark Matter with DRIFT

Wednesday, 6 August 2014 16:05 (30 minutes)

Presenter: LOOMBA, Dinesh (University of New Mexico)

Session Classification: Topical Conference II

Contribution ID: **80** Type: **not specified**

Results from Cosmic Ray Experiments

Wednesday, 6 August 2014 16:35 (30 minutes)

Presenter: Prof. WEINSTEIN, Amanda (Iowa State University)

Session Classification: Topical Conference II

Contribution ID: **81** Type: **not specified**

Results from the Fermi Gamma-Ray Space Telescope

Monday, 11 August 2014 14:45 (30 minutes)

Presenter: SANCHEZ-CONDE, Miguel (SLAC/Stanford)

Session Classification: Topical Conference III

Contribution ID: **82** Type: **not specified**

Results from AMS

Contribution ID: **83** Type: **not specified**

Results from IceCube

Monday, 11 August 2014 15:15 (30 minutes)

Presenter: VANDENBROUCKE, Justin (University of Wisconsin)

Session Classification: Topical Conference III

Contribution ID: **84** Type: **not specified**

Anomalies in the Indirect Detection of Dark Matter

Monday, 11 August 2014 16:05 (45 minutes)

Presenter: Dr HOOPER, Dan (fermilab)

Session Classification: Topical Conference III

Contribution ID: **85** Type: **not specified**

Results from DES

Wednesday, 13 August 2014 14:45 (30 minutes)

Presenter: JELTEMA, Tesla (University of California, Santa Cruz)

Session Classification: Topical Conference IV

Contribution ID: **86** Type: **not specified**

Results from BOSS

Wednesday, 13 August 2014 15:15 (30 minutes)

Presenter: BEUTLER, Florian (LBNL)

Session Classification: Topical Conference IV

Contribution ID: **87** Type: **not specified**

Results from Planck

Contribution ID: **88** Type: **not specified**

Polarization in the CMB

Wednesday, 13 August 2014 15:45 (30 minutes)

Presenter: Prof. KUO, Chao-Lin (SLAC/Stanford)

Session Classification: Topical Conference IV

Contribution ID: **89** Type: **not specified**

Neutron Majorana mass from exotic instantons

A Majorana mass for the neutron could result from non-perturbative quantum gravity effects peculiar to string theory. In particular, 'exotic instantons" in un-oriented string compactifications with D-branes extending the (supersymmetric) standard model could indirectly produce an effective operator $\delta m\, n^t n + h.c.$ In a specific model with an extra vector-like pair ofquarks', acquiring a large mass proportional to the string mass scale (exponentially suppressed by a function of the string moduli fields), δm can turn out to be as low as $10^{-24} - 10^{-25}\,\mathrm{eV}$.

The induced neutron-antineutron oscillations could take place with a time scale $\tau_{n\bar{n}} > 10^8 s$ that could be tested by the next generation of experiments.
On the other hand,
proton decay and FCNC's are automatically strongly suppressed and are compatible with the current experimental limits.

Depending on the number of brane intersections, the model may also lead to the generation of Majorana masses for R-handed neutrini.
Our proposal could also suggest neutron-neutralino or neutron-axino oscillations, with implications in UCN, Dark Matter Direct Detection, UHECR and Neutron-Antineutron oscillations.

This suggests to improve the limits on neutron-antineutron oscillations, as a possible test of string theory and quantum gravity.

Primary author: ADDAZI, andrea (I)

Presenter: ADDAZI, andrea (I)

Track Classification: Aug/12

Contribution ID: **90** Type: **not specified**

Vortices in Axion BEC (Bose-Einstein Condensate) dark matter.

We present an analytic study of vortices in Axion BEC dark matter and their effects on galactic angular momentum distribution of baryons and dark matter in disk galaxies.

Primary author: Mr BANIK, Nilanjan (University of Florida)

Co-author: Prof. SIKIVIE, Pierre (University of Florida)

Presenter: Mr BANIK, Nilanjan (University of Florida)

Track Classification: Aug/12

Contribution ID: **91** Type: **not specified**

Higgs Gravitational Interaction, Weak Boson Scattering, and Higgs Inflation in Jordan and Einstein Frames

We study gravitational interaction of Higgs boson through the unique dimension-4 operator ξHˆ{\dag}HR , with H the Higgs doublet and R the Ricci scalar curvature. We analyze the effect of this dimensionless nonminimal coupling ξ on weak gauge boson scattering in both Jordan and Einstein frames. We demonstrate that the weak boson scattering amplitudes computed in both frames are equal in flat background. We explicitly establish the longitudinal-Goldstone equivalence theorem with nonzero ξ coupling in both frames, and analyze the unitarity constraints. We study the ξ-induced weak boson scattering cross sections at O(1–30)TeV scales, and propose to probe the Higgs-gravity coupling via weak boson scattering experiments at the LHC (14 TeV) and the next generation pp colliders (50 – 100 TeV). We further extend our study to Higgs inflation, and quantitatively derive the perturbative unitarity bounds via coupled channel analysis, under large field background at the inflation scale. We analyze the unitarity constraints on the parameter space in both the conventional Higgs inflation and the improved models in light of the recent BICEP2 data.

Primary author: Dr REN, Jing (University of Toronto)

Co-authors: Prof. HE, Hong-Jian (Tsinghua University); XIANYU, Zhong-Zhi (Tsinghua University)

Presenter: Dr REN, Jing (University of Toronto)

Track Classification: Aug/12

Contribution ID: **92** Type: **not specified**

Ruling out bosonic repulsive dark matter in thermal equilibrium

Self-interacting dark matter, especially bosonic, has been considered a promising candidate to replace cold dark matter (CDM) as it resolves some of the problems associated with CDM. Here, we rule out the possibility that dark matter is a repulsive boson in thermal equilibrium. We develop the model first proposed by Goodman in 2000 and derive the equation of state at finite temperature. Isothermal spherical halo models indicate a Bose–Einstein condensed core surrounded by a non-degenerate envelope, with an abrupt density drop marking the boundary between the two phases. Comparing this feature with observed rotation curves constrains the interaction strength of our model's dark matter particle, and Bullet Cluster measurements constrain the scattering cross-section. Both ultimately can be cast as constraints on the particle's mass. We find these two constraints cannot be satisfied simultaneously in any realistic halo model –and hence dark matter cannot be a repulsive boson in thermal equilibrium. It is still left open that dark matter may be a repulsive boson provided it is not in thermal equilibrium; this requires that the mass of the particle be significantly less than a millivolt.

Primary author: Mr SLEPIAN, Zachary (Harvard University)

Co-author: Prof. GOODMAN, Jeremy (Princeton University)

Presenter: Mr SLEPIAN, Zachary (Harvard University)

Track Classification: Aug/6

Contribution ID: **93** Type: **not specified**

How dark matter, baryons, and radiation imprint scales on galaxy clustering today

The growth of structure around the time of matter-radiation equality, z˜3000, is determined by both the matter and radiation. Outside the sound horizon, inhomogeneities in the radiation contribute gravitationally to the growth of perturbations, as do inhomogeneities in the matter. In contrast, inside the sound horizon, the radiation inhomogeneities contribute less and less. This difference most strongly affects the growth of perturbations entering the horizon around matter-radiation equality, and is typically cast as a wavenumber-dependent transfer function that evolves the primordial spectrum of perturbations. Previously, analytic solutions have been found for both the small-wavenumber (outside the horizon) and large-wavenumber (deep inside the horizon) limits, and a full transfer function derived by interpolation between the two. This approach offers but inexact treatment of modes entering the horizon around matter-radiation equality. Here we present an analytic derivation of the transfer function valid on all scales. In particular, it accurately treats modes entering the horizon at equality, and also includes the baryon acoustic oscillations (BAO). Essentially, we offer a unified, simple picture of the growth of perturbations on all scales, valid in the linear regime of structure formation (z>100). This picture illustrates how the interplay of dark matter, baryons, and radiation imprints the horizon at both matter-radiation equality and at decoupling on the clustering of galaxies today.

Primary author: SLEPIAN, Zachary (H)

Co-author: Prof. EISENSTEIN, Daniel (Harvard University)

Presenter: SLEPIAN, Zachary (H)

Track Classification: Aug/12

Contribution ID: **94** Type: **not specified**

Phenomenology in Non-minimal Universal Extra Dimensions

We present a model with universal extra dimensions in the presence of boundary localized kinetic terms for electoroweak gauge bosons. This model can realize that the lightest Kaluza-Klein particle is a mixture of KK B^1 and KK W_3^1. Depending on boundary localized parameter (r_B, r_W) the KK dark matter is more like KK Z or KK photon. We showed current bounds on (r_B, r_W) from EWPT by 4-Fermi interaction operators.

Summary

In this work, we investigate boundary localized kinetic terms for electroweak gauge bosons. The mass matrix allows mixing between two KK neutral gauge bosons. In general, the LKP becomes a mixture of KK B^1 and KK W_3^1. We found a stringent bounds on R^{-1} or equivalently mass of LKP from 4-Fermi operators in r_W, r_B plane.

Primary authors: KANG, Dong Woo (Sungkyunkwan University (SKKU)); KONG, K.C. (University of Kansas); PARK, Seongchan (Sungkyunkwan University (SKKU)); FLACKE, Thomas Dieter (Korea Advanced Institute of Science and Technology (KR))

Presenter: KANG, Dong Woo (Sungkyunkwan University (SKKU))

Track Classification: Aug/6

Contribution ID: **95** Type: **not specified**

Overview and Performance of the ATLAS IBL Detector

For Run 2 of the LHC a fourth, innermost Pixel Detector layer on a smaller radius beam pipe has been installed in the ATLAS Detector to add redundancy against radiation damage of the current Pixel Detector and to ensure a high quality tracking and b-tagging performance of the Inner Detector over the coming years until the High Luminosity Upgrade. State of the art components have been produced and assembled onto support structures known as staves over the last two years. In total, 20 staves have been built and qualified in a designated Quality Assurance setup at CERN of which 14 have been integrated onto the beam pipe. Results from the testing are presented and represent the performance of the detector before integration into ATLAS.

Summary

During the Phase 0 upgrade of the ATLAS Detector an additional layer of the Pixel Detector, the Insertable B-Layer (IBL), is being installed. The IBL is composed of 14 carbon fibre staves with integrated titanium pipes for CO_2 cooling. Each stave hosts 32 FE-I4 chips, adding more than 12M read out channels in total. Two different sensor types are chosen: a planar design based on the current ATLAS Pixel sensor and 3D sensor designs which find their first application in high energy physics experiments. After full assembly and transportation to CERN the staves undergo Quality Assurance (QA) testing which will be described in this document.
The QA procedure covers important measurements to qualify a stave for integration around the beam pipe. This includes cold operation to simulate run time conditions as well as various calibration and data taking modes. The outcome of the stave QA procedure is used as a basis to select staves for integration and it provides a deeper understanding of the assembled detector.
In total, 20 staves have been produced as IBL candidates, for which the 14 highest ranked staves are to be installed in the IBL. Hence results from the QA represent a projection of the performance of the IBL after installation into the ATLAS Detector.

Primary author: HEIM, Timon (Bergische Universitaet Wuppertal (DE))

Presenter: HEIM, Timon (Bergische Universitaet Wuppertal (DE))

Track Classification: Aug/12

Contribution ID: **96** Type: **not specified**

Status of the PandaX Dark Matter Search Experiment in China

PandaX is a large dual-phase xenon detector experiment at China JinPing Deep-Underground Laboratory in China for direct dark-matter detection.
The detector has been running stable since late March of this yeay. And the poster will give the most recent status of the experiment including the detector calibration, data taking, first data analysis, etc.

Primary author: Mr XIAO, Mengjiao (Shanghai Jiao Tong University, Dept Phys)

Presenter: Mr XIAO, Mengjiao (Shanghai Jiao Tong University, Dept Phys)

Track Classification: Aug/12

Contribution ID: **97** Type: **not specified**

Dark matter and computational geometry

Traditional N-body simulations discretize the dark matter distribution into an ensemble of point particles. However, estimating the local density for a set of point particles is difficult due to Poisson noise. Abel et al. (2012) instead describe the phase-space distribution of dark matter as a 3D manifold tessellated into tetrahedra. This has the advantage of giving an unambiguous value for the density everywhere in configuration-space. Analyzing such a collection of tetrahedra requires a method for projecting a tetrahedron onto a uniform grid (voxelization). Various schemes have been tried (e.g. Angulo et al. 2013, Hahn et al. 2013), though each has its advantages and drawbacks.

I present here a new method for voxelizing polytopes. This method computes the exact intersection volume between the polytope and each voxel, so it is noiseless and exactly mass-conserving. In addition, polynomial functions defined over the polytope can be exactly voxelized, giving the ability to apply mass interpolation schemes over the phase-space sheet.

My implementation of this method yields an unprecedentedly smooth and continuous dark matter density field, with exciting prospects for studying the phase-space structure of dark matter haloes, WIMP annihilations, gravitational lensing, and more.

Primary author: Mr POWELL, Devon (SLAC/Stanford)

Co-author: Prof. ABEL, Tom (SLAC)

Presenter: Mr POWELL, Devon (SLAC/Stanford)

Track Classification: Aug/6

Contribution ID: **98** Type: **not specified**

Hidden Sector Dark Matter Models for the Galactic Center Gamma-Ray Excess

The gamma-ray excess observed from the Galactic Center can be interpreted as dark matter particles annihilating into Standard Model fermions with a cross section near that expected for a thermal relic. Although many particle physics models have been shown to be able to account for this signal, the fact that this particle has not yet been observed in direct detection experiments somewhat restricts the nature of its interactions. One way to suppress the dark matter's elastic scattering cross section with nuclei is to consider models in which the dark matter is part of a hidden sector. In such models, the dark matter can annihilate into other hidden sector particles, which then decay into Standard Model fermions through a small degree of mixing with the photon, Z, or Higgs bosons. After discussing the gamma-ray signal from hidden sector dark matter in general terms, we consider two concrete realizations: a hidden photon model in which the dark matter annihilates into a pair of vector gauge bosons that decay through kinetic mixing with the photon, and a scenario within the generalized NMSSM in which the dark matter is a singlino-like neutralino that annihilates into a pair of singlet Higgs bosons, which decay through their mixing with the Higgs bosons of the MSSM.

Primary authors: BERLIN, Asher (University of Chicago); MCDERMOTT, Samuel; Dr HOOPER, dan (fermilab)

Presenter: BERLIN, Asher (University of Chicago)

Track Classification: Aug/12

Contribution ID: **99** Type: **not specified**

Constraining light Shadow Z with low energy precision tests

A neutral vector boson, dubbed shadow Z', which stems from a hidden $U(1)_s$ gauge sector can weakly couple
to the standard model fermions through the kinematic mixing between the $U(1)_s$ and the hypercharge $U(1)_Y$.
If the shadow Z' is light, $< m_Z$, it can easily evade all collider constraint as long as the kinematic mixing
term is small. We study the feasibility of probing the
light shadow Z' gauge boson with the
low energy parity violating $e-p$, $e-d$, and $e-e$ scattering and the correlations among the experiments.

Primary author: CHANG, We-Fu (National Tsing Hua University)

Co-author: PAN, Wei-Ping (National Tsing Hua University)

Presenter: PAN, Wei-Ping (National Tsing Hua University)

Track Classification: Aug/12

Contribution ID: **100** Type: **not specified**

Dual-phase Liquid Xenon Detector Development at UCLA

The current leading experiments of direct dark matter detection use liquid xenon as the detecting medium. The strongly motivated dark matter candidates Weakly Interacting Massive Particles (WIMPs) are expected to create nuclear recoils in the liquid xenon. During the long measurement period, the detectors face a great challenge of an overwhelming radioactive background in the form of electronic recoils.

Therefore, a comprehensive understanding of the liquid xenon responses to both nuclear and electronic recoils is of great interests to the dark matter detection with liquid xenon, especially in the low energy region where the liquid xenon is more sensitive to dark matter while current knowledge is severely constrained.

A dual-phase liquid xenon detector as an R&D effort is developing at UCLA, aiming to map the parameters of liquid xenon responses to both nuclear and electronic recoils. This measurement will be of a great help in interpreting the dark matter detection results from liquid xenon detectors such as XENON and LUX.

Primary author: Mr MENG, Yixiong (UCLA)

Presenter: Mr MENG, Yixiong (UCLA)

Track Classification: Aug/12

Contribution ID: **101** Type: **not specified**

Loop Effects of an Effective Dark Matter Model on Dilepton Production

While LHC searches for new resonance states (Z' models) are ongoing in the neutral-current Drell-Yan process, one of the cleanest channels to seek New Physics, it is important to also look for non-resonant effects. In particular, box diagrams with hidden sector TeV-scale states can interfere with the Standard Model to produce spectacular dilepton spectra. To this end, I will motivate an effective theory with a hidden sector that provides a dark matter candidate, and discuss the role of dispersion relations in producing these new signals. I will conclude with constraints from the dark matter relic abundance, and direct detection and collider experiments.

Primary author: RAJ, Nirmal (University of Oregon)

Co-authors: KRIBS, Graham (University of Oregon); FOX, Patrick; HARNIK, Roni (Fermilab); ALTMANNSHOFER, Wolfgang (Perimeter Institute)

Presenter: RAJ, Nirmal (University of Oregon)

Track Classification: Aug/6

Contribution ID: **102** Type: **not specified**

Inflation with an oscillating field

We propose that if there is a massive scalar field oscillating at its vacuum during the slow-roll inflation, its settlement will distort the primordial power spectrum from the simple power law. At the scales which exit the Hubble radius during the oscillation, the power of curvature perturbations oscillates on top of the nearly scale-invariant spectrum. Assuming that the last stage of inflation goes like the chaotic inflation at the energy of 10^{16} GeV, we find that a scalar field oscillating at about 60 e-folds before the end of inflation will impose some wiggles to the lower modes of the cosmic microwave background temperature spectrum, therefore relieving the persisting tension between the low-ℓ and high-ℓ spectra. The comparison to the Planck observation and the likelihood are given.

Primary authors: Prof. CHEN, Pisin (Graduate Institute of Astrophysics, National Taiwan University); Mr LIN, Yu-Hsiang (Department of Physics, National Taiwan University)

Presenter: Mr LIN, Yu-Hsiang (Department of Physics, National Taiwan University)

Track Classification: Aug/12

Contribution ID: **103** Type: **not specified**

The XENON Dark Matter Project

The XENON Experiment aims to detect dark matter particles by WIMPs scattering off a nucleus. It operates a dual phase time projection chamber with liquid xenon as detection material. XENON100 was the most sensitive experiment to spin-independent WIMP-nucleon interaction for WIMP masses above 8 GeV/c² from 2010 to 2012.
XENON1T is the future experiment whose aim is an increased sensitivity by a factor 100. For this a background reduction by a factor 100 compared to XENON100 is required. Highly sensitive gas analytic and screening methods have been developed in order to guarantee these low background rates of $5 \cdot 10^{-5}$ events/day/keV/kg.

Primary author: HASTEROK, Constanze

Presenter: HASTEROK, Constanze

Track Classification: Aug/12

Contribution ID: **104** Type: **not specified**

XENON1T detector

The XENON1T detector is a dual-phase time projection chamber with a total of 3200kg of liquid xenon to search for dark matter. XENON1T is currently under construction at the Gran Sasso underground laboratory for commissioning early 2015. With a fiducial volume of at least 1000kg and a background more than two orders of magnitude below that of XENON100, the XENON1T experiment will be able to probe a particularly rich region of the electroweak-scale parameter space, with a sensitivity \sigma_{\n{SI}}\sim 2\times10^{-47}\,\n{cm}^2 within 2 years of operation. This poster will present the detector, some design aspects, and its sensitivity.

Primary authors: PIENAAR, Jacques (Purdue University); CERVANTES VALDOVINOS, Mayra Daniela (Purdue University (US)); SHAYNE, Richard (Purdue University)

Co-author: LANG, Rafael

Presenter: CERVANTES VALDOVINOS, Mayra Daniela (Purdue University (US))

Track Classification: Aug/6

Contribution ID: **105** Type: **not specified**

The SuperCDMS Active Neutron Shielding Concept

Future large scale cryogenic dark matter experiments –such as EURECA or SuperCDMS - will focus on the exploration of low mass WIMPS reaching for unparalleled sensitivities for the cross section of spin-independent WIMP-nucleon interactions. This requires an unprecedented suppression of the background in the nuclear recoil band down to 1 event/ton/year in the region of interest. External and internal shielding together with an active veto system have to be installed to suppress multiple sources of background –an important of which being radiogenic and cosmogenic neutrons. In this poster, we will focus on the development of the SuperCDMS active neutron shied – a loaded scintillator in the vicinity of the detectors acting as a dedicated ambient neutron veto.

Primary author: HEUERMANN, Geertje

Presenter: HEUERMANN, Geertje

Track Classification: Aug/12

Contribution ID: **106** Type: **not specified**

Charge migration in the germanium detectors of the EDELWEISS-III experiment

EDELWEISS-III is a direct dark matter search program looking for WIMPs using cryogenic germanium bolometers. A system of electrodes produces a homogeneous electric field in the inner region of the germanium crystals. The simultaneous readout of the heat increase and the ionization signal from scattered particles allows the discrimination of germanium nuclei recoils from electron recoils. For a discrimination of γ-ray background (electron recoils) of the order of 10^5 the charge collection has to be as complete as possible.
In this poster the principle of modeling the charge migration in high purity germanium crystals at low temperatures ($20\,\mathrm{mK}$) and low electric fields ($< 10\,\mathrm{V/cm}$) is presented. Results from measurements with a test detector, that is produced the same way as the EDELWEISS-III detectors, are shown.
This work is supported by the DFG graduate school KSETA (Karlsruhe School of Elementary Particle and Astroparticle Physics: Science and Technology)

Primary author: FOERSTER, Nadine (Karlsruhe Institute for Technology)

Presenter: FOERSTER, Nadine (Karlsruhe Institute for Technology)

Track Classification: Aug/6

Contribution ID: **107** Type: **not specified**

TPC monitoring for LUX-ZEPLIN experiment

In this poster, some preliminary results of the temperature and electromagnetic monitoring in the proposed LUX-ZEPLIN experiment will be presented. It discusses the difficulty and the importance of monitoring TPC.

Primary author: LIN, Junsong (U)

Presenter: LIN, Junsong (U)

Track Classification: Aug/12

Contribution ID: **108** Type: **not specified**

The DarkSide-50 Dark Matter Detector

DarkSide-50 is the first physics detector of the DarkSide dark matter search program. The detector features a dual phase underground argon Time Projection Chamber (TPC) of 50 kg active mass surrounded by an organic liquid scintillator neutron veto and a water-Cherenkov muon detector. The TPC is currently fully shielded and operating underground at Gran Sasso National Laboratory (LNGS) using research grade atmospheric argon. Exploiting the high rate of electronic recoils from ^{39}Ar in regular argon to collect the background statistics expected in a few years of data taking with low-radioactivity underground argon, this first run is focused on the study of the detector response and its performance in background suppression.

Primary author: FAN, Alden (U)

Presenter: FAN, Alden (U)

Track Classification: Aug/12

Contribution ID: **109** Type: **not specified**

Systematic Sources of Uncertainty in NaI(Tl) Dark Matter Detectors

Despite over a decade of exploring everything from detector systematics to exotic dark matter models, there has yet to be a satisfactory explanation of the DAMA results. Construction is currently underway for an experiment that will be able to determine whether an environmental or operational parameter could be responsible for DAMA's signal. This experiment features a total of 32 three-inch NaI(Tl) detectors in 4 separate locations to monitor the radioactive decay of various isotopes, including ^{40}K. The experiment will feature comprehensive monitoring of environmental and operating conditions and an advanced data acquisition, which will allow for event-by-event analysis and correlation studies. Together with an artificial pulser, this allows a measurement of the absolute rate of each isotope, as opposed to the traditional method of measuring the activity relative to a reference source. We expect that this approach will allow us to accurately determine the impact of various environmental parameters to the apparent decay rate in order to determine the source of DAMA's variations, as well as potential pitfalls to other dark matter experiments.

Primary author: Ms REUTER, Cassie (Purdue University)

Co-author: Prof. LANG, Rafael (Purdue University)

Presenter: Ms REUTER, Cassie (Purdue University)

Track Classification: Aug/6

Contribution ID: **110** Type: **not specified**

Geometry from probability: A possible origin of dark energy or the inflaton

A principle is proposed that relates probability to geometry. That principle is then used to motivate the introduction of nonlinear differential operators on spacetime manifolds. Such operators are difficult to handle mathematically, hence a geometric interpretation of the Universal Covering Group for tensors is undertaken. The principle can then be understood as equivalent to a Lagrangian of classical and quantum fields. Taking a subalgebra based on geometric objects formed of direct sums of scalar and vector fields, it is possible to define the analog of the metric and curvature. Unlike the old Kaluza-Klein theory, which it resembles, the fiber bundle structure is isomorphic to that of ordinary four dimen- sional spacetime, and the fields are dependent on only four dimensions. Using the dynamics of particles responding to the extended metric, it's possible to read off the non-zero equivalent of Cristoffel symbols from the equation of motion. It turns out that a simple set of constraints on the standard Klein-Gordon Cristoffel symbols yield the same results. The equivalent Ricci tensor of this geometry yields vacuum general relativity and electromagnetism, as well as a Klein-Gordon-like quantum field. With a generalization of the stress-energy tensor, an exact solution for a plane-symmetric dust can be found where the scalar portion of the field drives early universe inflation, levels off for a period, then causes later enhanced universal acceleration. That suggests that some version of this theory may be of utility in modeling the effects of the inflaton or dark energy.

Summary

This work develops a new geometry that is a simple extension of standard tensor analysis, applying it to create a Kaluza-Klein-like theory. An exact cosmological solution for a plane-symmetric dust gives a dynamic universe with early inflation and later accelerated expansion.

Primary author: Dr VUILLE, Chris (Embry-Riddle Aeronautical University)

Presenter: Dr VUILLE, Chris (Embry-Riddle Aeronautical University)

Track Classification: Aug/6

Contribution ID: **111** Type: **not specified**

Signatures of Dark Matter Scattering Inelastically Off Nuclei

Direct dark matter detection focuses on elastic scattering of dark matter particles off nuclei. In this poster, we investigate inelastic scattering in which the target nucleus is excited to a low-lying state of ˜10-100 keV, with a subsequent prompt de-excitation. We calculate the inelastic structure factors of the odd-mass xenon isotopes based on state-of-the-art large-scale shell-model calculations with chiral effective field theory WIMP-nucleon currents. For these cases, we find that the inelastic channel is comparable to or can dominate the elastic channel for momentum transfers ˜150 MeV. We calculate the inelastic recoil spectra in the standard halo model and compare them to the elastic case. We then discuss the expected signatures in a liquid xenon detector, such as XENON1T, along with implications for current and future experiments. XMASS has provided first limits on WIMP scattering off Xe-129 that are derived exclusively from data of inelastic scattering.

Primary authors: KESSLER, Gaudenz (University of Zurich); KLOS, Philipp (ExtreMe Matter Institute); REICHARD, Shayne (Purdue University)

Co-authors: SCHWENK, Achim (ExtreMe Matter Institute); MENENDEZ, Javier (ExtreMe Matter Institute); BAUDIS, Laura (University of Zurich); LANG, Rafael (Purdue University)

Presenter: REICHARD, Shayne (Purdue University)

Track Classification: Aug/6

Contribution ID: **112** Type: **not specified**

Calibration Systems of the XENON1T Dark Matter Experiment

The XENON1T detector, currently under construction at the Gran Sasso underground laboratory, will contain 3200kg of liquid xenon. A liquid noble element detector needs to be calibrated to understand its responses to both electronic and nuclear recoils. The additional volume of XENON1T poses new opportunities and new challenges. The greater volume makes it possible to use neutron double scatters from a DD-fusion generator to achieve an in situ nuclear recoil energy calibration. However, introducing sufficient activity into the inner volume to perform electronic recoil calibrations becomes challenging due to the larger volume. Dissolved sources in the liquid xenon offer a solution to this challenge. Thorium-228, the daughters of which produce a low-energy beta spectrum of interest, has been identified as one potential dissolved source. The calibration systems of XENON1T are presented in this poster.

Primary author: Mr PIENAAR, Jacques (Purdue University)

Co-authors: Ms CERVANTES, Mayra (Purdue University); Prof. LANG, Rafael (Purdue University); Dr MACMULLIN, Sean (Purdue University); Mr REICHARD, Shayne (Purdue University)

Presenter: Mr PIENAAR, Jacques (Purdue University)

Track Classification: Aug/6

Contribution ID: **113** Type: **not specified**

Dark Matter Annihilations in the Causal Diamond

We investigate the implications of dark matter annihilations for
cosmological parameter constraints using the
causal entropic principle. In this approach cosmologies are
weighted by the total entropy production within a
causally connected region of spacetime. We calculate the expected
entropy from dark matter annihilations within the causal diamond and investigate the preferred values of
the cosmological constant and the mass and annihilation cross section of the annihilating dark matter
and their dependence on the assumptions in the models. For realistic values of the cross section we typically
find preferred values of Λ on the order of 10^{-5} of the
present value assuming dark matter annihilations are the primary
source of entropy production. The
greatest amount of entropy production from dark matter within the
causal diamond is likely to occur with light keV scale dark matter with low annihilation cross section. We also investigate the effect of
combining this entropy with the entropy production from stars, and show that if the primary source of entropy production is from stars, varying the dark matter cross section directly produces a preferred value of Ω_m in excellent agreement with observations.

Primary author: SCACCO, Andrew (UC Davis)

Co-author: ALBRECHT, Andreas (UC Davis)

Presenter: SCACCO, Andrew (UC Davis)

Track Classification: Aug/12

Contribution ID: **114** Type: **not specified**

Numerical evolution of two autogravitating scalar fields with spontaneous symmetry breaking

We solve numerically the Einstein equations in spherical symmetry for a system of two coupled real scalar fields that exhibits spontaneous symmetry breaking,
and where one of the fields, initially massless, acquires an effective mass due to the coupling. We study first the evolution of the homogeneous fields, and then we add
Gaussian pulses in one of them. We find the evolution of the density contrast and the regions of the initial condition space in which these pulses collapse into
black holes during the time of the simulation. This system may be of interest for studying the evolution of perturbations in a hybrid inflation-like scenario.

Primary author: OLIVARES SANCHEZ, Hector Raul (CINVESTAV)

Co-authors: Prof. MIGUEL, Alcubierre (ICN, UNAM); Prof. MATOS, Tonatiuh (CINVESTAV)

Presenter: OLIVARES SANCHEZ, Hector Raul (CINVESTAV)

Track Classification: Aug/12

Contribution ID: **115** Type: **not specified**

Production of Tetraquarks at LHC

Since ten years ago a host of exotic resonances have challenged the ususal quarkonium picture. A number of ideas have been put forward to explain these new states, but a comprehensive framework is still missing. We present here results on $X(3872)$ production in $pp(\bar{p})$ collisions obtained with Monte Carlo hadronization methods and illustrate what can be learned from their use to improve our understanding of exotic states. A comparison with antideuteron production is proposed. Hadronization might be the key to solve the problem of the extra states expected in diquark-antidiquark models.

Primary authors: PILLONI, Alessandro (Sapienza U.); GUERRIERI, Andrea (Università di Roma "Tor Vergata"); POLOSA, Antonio (Universita' La Sapienza, Roma - Italy); PICCININI, Fulvio (Universita e INFN (IT))

Presenter: PILLONI, Alessandro (Sapienza U.)

Track Classification: Aug/12

Contribution ID: **116** Type: **not specified**

LSST Camera Sensor Characterization

The Large Synoptic Survey Telescope (LSST) will use a 3.2 Gigapixel CCD camera to conduct a deep ($M_r < 27.5$) wide-field survey of the Southern sky in six optical bands (u, g, r, i, z, and y) over 10 years. The science drivers of the survey, particularly precision measurements of weak lensing, place tight constraints on camera performance in terms of both photometry and galaxy shape measurement.

This poster describes the program of sensor testing and characterization that has been developed to meet these camera performance goals, focusing primarily on methods developed to characterize pixel size uniformity and the flux-dependence of the PSF (the 'brighter-fatter effect').

Primary author: Mr BAUMER, Michael (Stanford University)

Presenter: Mr BAUMER, Michael (Stanford University)

Track Classification: Aug/12

Contribution ID: **117** Type: **not specified**

Particle Fever: The Movie

Friday, 8 August 2014 14:45 (1h 45m)

Session Classification: Special Topic Session

Contribution ID: **118** Type: **not specified**

Team 1b: Direct detection below neutrino floor

Thursday, 14 August 2014 14:18 (18 minutes)

Presenters: FAN, Alden (UCLA); JARDIN, Dan (Southern Methodist University); NEWSTEAD, Jayden (Arizona State University)

Session Classification: Project Presentations

Contribution ID: **119** Type: **not specified**

Team 3: Devise prediction using Dark Sky simulation

Thursday, 14 August 2014 14:36 (18 minutes)

Presenters: SCACCO, Andrew (UC Davis); POWELL, Devon (Stanford)

Session Classification: Project Presentations

Contribution ID: **120** Type: **not specified**

Team 5: DM signal vs astrophysical sources

Thursday, 14 August 2014 14:54 (18 minutes)

Presenters: KWA, Anna (UC Irvine); POON, Helen (Max Planck Institut fur Kernphysik); BOUDAUD, Mathieu (LAPTh)

Session Classification: Project Presentations

Contribution ID: **121** Type: **not specified**

Team 8: How to detect invisible Higgs decays

Thursday, 14 August 2014 15:12 (18 minutes)

Presenter: BERLIN, Asher (University of Chicago)

Session Classification: Project Presentations

Contribution ID: **122** Type: **not specified**

Team 10: LHC missing Et excess => DM signal ?

Thursday, 14 August 2014 15:30 (18 minutes)

Presenters: PENA HERRERA, Cristian Ignacio (California Institute of Technology (US)); LIEM, Sebastian (NIKHEF (NL))

Session Classification: Project Presentations

Contribution ID: **123** Type: **not specified**

Team 11: Direct detection down to 100 MeV

Thursday, 14 August 2014 15:48 (18 minutes)

Presenters: HEUERMANN, Geertje (KIT); FOERSTER, Nadine (KIT)

Session Classification: Project Presentations

Contribution ID: **124** Type: **not specified**

Team 16: How to tell if axion is 20% of DM signal ?

Thursday, 14 August 2014 16:42 (18 minutes)

Presenters: EGANA, Daniel (Rutgers University); LORSHBOUGH, Dustin (Univ of Texas, Austin); IZAGUIRRE, Ignacio (MPP)

Session Classification: Project Presentations

Contribution ID: **125** Type: **not specified**

Team 17: Observations to distinguish CDM from other models

Thursday, 14 August 2014 17:00 (18 minutes)

Presenter: PORTILLO, Stephen (Harvard University)

Session Classification: Project Presentations

Contribution ID: **126** Type: **not specified**

Team 19: How to distinguish decaying and stable DM ?

Thursday, 14 August 2014 17:18 (18 minutes)

Presenters: BRYNGEMARK, Lene (Lund University (SE)); CARNEY, Rebecca (University of Edinburgh (GB)); TOLK, Siim (NIKHEF (NL))

Session Classification: Project Presentations

Contribution ID: **127** Type: **not specified**

Team 20: Constrain density slope in the Milkyway

Thursday, 14 August 2014 17:36 (18 minutes)

Presenters: TRIPATHI, Anjali (Harvard University); SILVERWOOD, Hamish (University of Amsterdam); LI, Weishi (Ohio State U); SLEPIAN, Zachary (H)

Session Classification: Project Presentations