Poster presentation (Last update on 12/5) Scheduled on 12/15

Eromanga Adermann

Title:Exploring the Cosmic Web in Alternative Cosmologies

Abstract:
Using state of the art numerical simulations, I will unravel the observational signatures of several alternative cosmological models in the large scale structure of the cosmic web. The key observational probe under study is evolution of cosmological voids, in particular their size, distribution and growth, to provide us with clues to the underlying cosmology of the Universe. While the ultimate goal is to include galaxy formation recipes to determine the true efficacy of using cosmic voids in realistic future surveys with next generation telescopes, we will present the initial results of the void distribution in the redshift-zero universe, showing that universes with an evolving and decaying dark sector have a significant imprint on the void structure when compared to a vanilla Lambda-CDM cosmology.

Weijian Wang

Title:Radiative Linear Seesaw, Dark Matter and B-L symmetry

Abstract:
We propose a radiated linear seesaw model where the naturally small term μL are generated at one-loop level and its soft-breaking of lepton number symmetry attributes to the spontaneous breaking(SSB) of B-L gauge symmetry. The value of B−L charges for new particles are assigned to satisfy the anomalies cancelation. It is founded that some new particles may have exotic values of B−L charge such that there exists residual Z2×Z′2 symmetry even after SSB of B−L gauge symmetry. The Z2×Z′2 discrete symmetry stabilizes the these particles as dark matter candidates. In the model, two no-interplay classes of inert fermions and scalars are introduced, leading to two-component dark matter candidates. The lepton flavor violation processes, the relic density of dark matter, the direct detection of dark matter and the phenomenology on collider machine are investigated.

Nobuhiro Maekawa

Title:Neutrino masses and mixings as signature of GUT and the impact to nucleon decay

Abstract:
First I will show that observed neutrino data give a signature of SU(5) GUT. Only an assumption in SU(5) GUT can explain various hierarchies of quark and lepton masses and mixings.
Next, I will emphasize that the E6 GUT is more attractive because the assumption can be derived in E6 GUT. Under the understanding the Yukawa structures, the ambiguities in predicting the nucleon decay are reduced. I will show the detail calculation for the nucleon decay, which can identify the unification group. Especially, I will show that the flavor changing necleon decay such as p->mu+pi, whose signal has been found in superKamiokande recently (2 events), implies larger rank of unification group, although the signal is still consistent with the back ground (0.9 event).

Poster presentation (Last update on 12/5) Scheduled on 12/15

Seong Youl Choi

Title:Characterizing invisible electroweak particles through single-photon processes at high energy $e^+e^-$ colliders

Abstract:
We explore the scenarios where the only accessible new states at the electroweak scale consist of a pair of color-singlet electroweak particles, whose masses are degenerate at the tree level and split only by electroweak symmetry breaking at the loop level. Due to the mass-degeneracy, those lower-lying electroweak states are difficult to observe at the LHC and rather challenging to detect at the $e^+e^−$ collider as well. We exploit the pair production in association with a hard photon radiation in high energy e+e− collisions. If kinematically accessible, such single-photon processes at $e^+e^−$ colliders with polarized beams enable us to characterize each scenario by measuring the energy and scattering angle of the associated hard photon, and to determine the spin of the nearly invisible particles unambiguously through the threshold behavior in the photon energy distribution.

Erin Edkins Ludert

Title:DarkSide Direct Dark Matter Search with Underground Argon

Abstract:
We will present the recent results of the DarkSide-50 direct dark matter experiment using low-radioactivity argon from underground sources as a detector medium, the first result using such a target.? DarkSide-50 is a 50 kg (36.9 kg fiducial) Liquid Argon Time Projection Chamber located inside a 30 t liquid scintillator neutron veto, which is in turn located inside a 1 kt water Cherenkov muon veto. The DarkSide experiment is housed underground at the Laboratori Nazionali del Gran Sasso (LNGS).
The results of 70.9 live-days of data taking with underground argon?will be presented. This represents the most sensitive search with an argon target to date.? Underground argon is shown to have strongly suppressed 39Ar activity, making it possible for multi-tonne-year exposures to be free of this background. Plans for the 20 t detector will also be presented

Mikhail Katanaev

Title:On homogeneous and isotropic universe

Abstract:
We give a simple example of space-time metric, illustrating that homogeneity and isotropy of space slices at all moments of time is not obligatory lifted to a full system of six Killing vector fields in space-time, thus it cannot be interpreted as a symmetry of a four dimensional metric. The metric depends on two arbitrary and independent functions of time. One of these functions is the usual scale factor. The second function cannot be removed by coordinate
transformations. We prove that it must be equal to zero, if the metric satisfies Einstein's equations and the matter energy momentum tensor is homogeneous and isotropic. A new, equivalent, definition of homogeneous and isotropic space-time is given.

Poster presentation (Last update on 12/5) Scheduled on 12/15

Ooba Junpei:

Title:Planck constraints on scalar-tensor cosmology and the variation of the gravitational constant

Abstract:
We present cosmological constraints on the scalar-tensor theory of gravity using CMB angular power spectrum data from Planck 2015 results. The model we consider is the harmonic attractor model, in which the scalar field has its harmonic potential with curvature ($￥beta$) in the Einstein conformal frame and the theory relaxes toward the Einstein gravity with time. The data contain {￥it TT}, {￥it EE}, {￥it TE} angular power spectra of the CMB and we carried out the data analysis to constrain the cosmological parameters by the MCMC method. As a result, we find that the present deviation from the Einstein gravity (${￥alpha_0}^2$) is constrained as ${￥alpha_0}^2<10^{-4-50￥beta^3}￥ (2￥sigma)$ and ${￥alpha_0}^2<3￥times10^{-4-50￥beta^3}￥ (4￥sigma)$ for $0<￥beta<0.45$. The variation of the effective gravitational constant at the recombination epoch is constrained as $G_{￥rm rec}/G_0<1.0030￥ (2￥sigma)$ and $G_{￥rm rec}/G_0<1.0065￥ (4￥sigma)$. Our result shows that The deviation of the gravitational constant at the recombination epoch from the today's value is smaller than 1￥%, it is very strong constraint on the variation of the gravitational constant.

Peiwen Wu

Title:Scalar Dark Matter with a Vector-like Top Partner

Abstract:
We investigated the phenomenology of the extension of the SM with a singlet scalar (S) and a vector-like top partner (T) which has the same quantum number as the right-handed top quark. By assuming a Z2 dark parity to the new particles, we have the scalar S acting as the dark matter (DM) candidate. We studied the suitable parameter space consistent with the observed DM relic density, vacuum stability as well as the current DM direct detection experiments. For the production of a pair of T which later decay into DMs and the top quark pair, we also discussed the possible constraints on the model from CMS ttbar+MET measurement at 8 TeV.

Juan Carlos Gomez

Title:Breaking $mu- au$ symmetry through the ${ f Q}_{6}$ flavour group

Abstract:
In a supersymmetry scenario, we study masses and mixings for leptons through the ${ f Q}_{6}$ flavour symmetry. In the simplest case, the ${ f M}_{u}$ effective neutrino mass matrix, that comes from the type I see-saw mechanism, breaks the $mu leftrightarrow au$ interchange symmetry. As consequence, the reactor and atmospheric angles are deviated of $0^{circ}$ and $45^{circ}$, respectively. At first glance, the model might accommodate very well the reactor and atmospheric angles in good agreement with the experimental data.

Shinsuki Asaba

Title:The effect of the supersonic relative motion between baryons and dark matter on the structure formation

Abstract:
One of aims of upcoming radio interferometers such as Square Kilometre Array is an observing small-scale structure via the 21-cm hyperfine structure line from neutral hydrogen atoms before the epoch of reionization. It is expected that this observables contain a wealth of information about unresolved cosmological questions. On the other hand, Tseliakhovich & Hirata (2010) have pointed out the supersonic relative motion between baryons and dark matter after the recombination suppresses abundances of the small mass halos. This suppression impacts succeeding first star or galaxy formations, the reionization history and galaxy distributions. The modeling of the suppression by the supersonic streaming motion is desired for high precision cosmology by utilizing future observations.
We have modeled the effect of the supersonic relative motion on the structure formation by expanding the spherical collapse model. When the delay of the collapse time of dark matter halo by the supersonic motion is converted into the change of the critical density in Press-Schechter formalism, we found that the suppression of the halo abundance at the mass scale of 10^5M_odot reaches a half at z=10. We also compare the mass function estimated from the Press-Schechter formalize to the result of the cosmological N-body simulation.

Shohei Okawa

Title:Form factor effects in a Higgs portal pionic dark matter model

Abstract:
It is an interesting possibility that dark matter interacts the SM particles only through the Higgs portal.
If we consider a QCD-like confining gauge theory in the hidden sector, the pseudo Nambu-Goldstone bosons arising from the spontaneous chiral symmetry breaking are the lightest hadron-like particles in the hidden sector and can therefore be dark matter.
We call this dark matter candidates dark pions.
In this presentation, we will show that the portal interaction between the Higgs and the dark pions is related to scalar form factor of the dark pion and enhancement effects by this form factor relax constraint on the dark matter mass.

Toshinori Matsui

Title:Gravitational waves as a probe of extended Higgs sectors with the first order electroweak phase transition

Abstract:
We discuss spectra of gravitational waves which are originated by the strongly first order phase transition at the electroweak symmetry breaking, which is required for a successful scenario of electroweak baryogenesis. Such spectra are numerically evaluated in a set of

extended scalar sectors with additional N isospin-singlet fields as a concrete example of renormalizable theories. We show the produced gravitational waves can be significant, so that they are detectable at future gravitational wave interferometers. Furthermore, we conclude that future detailed observation of gravitational waves can be generally useful as a probe of extended scalar sectors with the first order phase transition. This talk is based on arXiv:1509.08394 [hep-ph], with M. Kakizaki and S. Kanemura.

Wataru Kuramoto

Title:Nucleon Electric Dipole Moments in High-Scale Supersymmetric Models

Abstract:
The electric dipole moments (EDMs) of electron and nucleons are promising probes of the new physics. In generic high-scale supersymmetric (SUSY) scenarios such as models based on mixture of the anomaly and gauge mediations, gluino has an additional contribution to the nucleon EDMs. In this paper, we studied the effect of the CP-violating gluon Weinberg operator induced by the gluino chromoelectric dipole moment in the high-scale SUSY scenarios, and we evaluated the nucleon and electron EDMs in the scenarios. We found that in the generic high-scale SUSY models, the nucleon EDMs may receive the sizable contribution from the Weinberg operator. Thus, it is important to compare the nucleon EDMs with the electron one in order to discriminate among the high-scale SUSY models.

Yoshihiro Kurosawa

Title:Asymmetric dark matter and effective number of neutrinos

Abstract:
We study the effect of the MeV-scale asymmetric dark matter annihilation on the effective number of neutrinos $N_{m eff}$ at the epoch of the big bang nucleosynthesis. If the asymmetric dark matter $chi$ couples more strongly to the neutrinos $
u$ than to the photons $gamma$ and electrons $e^-$, $Gamma_{chigamma, chi e} ll Gamma_{chi u}$, or $Gamma_{chigamma, chi e} gg Gamma_{chi u}$, the lower mass limit on the asymmetric dark matter is about $18$ MeV for $N_{m eff}simeq 3.0$.

Shu-Yu Ho

Title:Exploring X-Ray Lines as Scotogenic Signals

Abstract:
We consider some implications of X-ray lines from certain astronomical objects as potential effects of dark matter decay in the context of the scotogenic model, where neutrinos acquire mass radiatively via one-loop interactions with dark matter. As an example, we focus on the 3.5 keV line recently detected in the X-ray spectra of galaxy clusters, assuming that it stands future scrutiny. We explore the scenario in which the line originates from the slow decay of fermionic dark matter in the model. After obtaining a number of benchmark points representing the parameter space consistent with the new data and various other constraints, we make predictions on several observables in leptonic processes. They include the effective Majorana mass in neutrinoless double-beta decay,

the sum of neutrino masses, and the rate of flavor-changing decay mu -> e gamma, as well as the cross sections of e+e- collisions into final states containing nonstandard particles in the model. These are testable in ongoing or future experiments and thus offer means to probe the scotogenic scenario studied.

Daiki Yasuhara

Title:Contribution of right-handed neutrinos for reheting era leptogenesis

Abstract:
Recently, Y.Hamada and K.Kiyoharu suggest a novel leptogenesis scenario which requires only higher dimensional operators in addition to the standard model. The lepton number asymmetry can be produced by the scattering between the standard model particles.
In this study, I confirm that typical models with heavy right-handed neutrinos can derive necesary higher dimensional operators and CP breaking phases and evaluate its size.