International Workshop on Grand Unified Theories: Current Status and Future Prospects

Report of Contributions

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

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

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

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

(no title)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

(no title)

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

(no title)

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

(no title)

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

Welcome to Ritsumeikan University

Monday, 17 December 2007 09:00 (5 minutes)

Session Classification: Plenary Talks

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

Scope of Workshop and Organization questions

Monday, 17 December 2007 09:05 (10 minutes)

Primary author: Prof. FUKUYAMA, Takeshi (Ritsumeikan University)

Presenter: Prof. FUKUYAMA, Takeshi (Ritsumeikan University)

Session Classification: Plenary Talks

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

Does the extra dimension rescue the SO(10) GUT?

Monday, 17 December 2007 09:20 (50 minutes)

Primary author: Prof. FUKUYAMA, Takeshi (Ritsumeikan University)

Presenter: Prof. FUKUYAMA, Takeshi (Ritsumeikan University)

Session Classification: Plenary Talks

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

Review of phenomenological models

Monday, 17 December 2007 10:10 (20 minutes)

Primary author: Dr MATSUDA, Koichi (Tsinghua University)

Presenter: Dr MATSUDA, Koichi (Tsinghua University)

Session Classification: Plenary Talks

Contribution ID: **59** Type: **not specified**

Discrete Gauge Symmetries and Proton Stability in grand unified theories

Monday, 17 December 2007 11:00 (50 minutes)

We discuss the results of a search for anomaly free Abelian Z_N discrete symmetries that lead to automatic R-parity conservation and prevents dangerous higher-dimensional proton decay operators in simple extensions of the minimal supersymmetric extension of the standard model (MSSM) based on the left-right symmetric group, the Pati-Salam group and SO(10). We require that the superpotential for the models have enough structures to be able to give correct symmetry breaking to MSSM and potentially realistic fermion masses. We find viable models in each of the extensions and for all the cases, anomaly freedom of the discrete symmetry restricts the number of generations.

Primary author: Prof. MOHAPATRA, Rabindra. N. (University of Maryland)

Presenter: Prof. MOHAPATRA, Rabindra. N. (University of Maryland)

Session Classification: Plenary Talks

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

B-aniti-B mixing and lepton flavor violation in supersymmetric grand unified models

Monday, 17 December 2007 11:50 (20 minutes)

We study B-anti-B mixing in grand unified SO(10), SU(5) models where the mixings among the second and third generation squarks arise due to the existence of flavor violating sources in the Dirac and Majorana couplings which are responsible for neutrino mixings. We find that when the branching ratio of tau->mu gamma decay is enhanced to be around the current experimental bound, B_s-anti-B mixing may also contain large contribution from supersymmetry in the SO(10) boundary condition. We also study the constraint arising from the recently observed D-anti-D mixing. In the left-right symmetric unified models, the supersymmetric contributions in the mixing amplitudes of D-anti-D, K-anti-K and B-anti-B are all correlated. We compare the constraint from the D-D mixing with the K-anti-K mixing and find that the D-anti-D mixing constrains the maximal supersymmetric contribution to the B_s-anti-B_s mixing amplitude. The maximal supersymmetric contribution can allow a large CP phase of B_s-anti-B_s mixing which can be tested by the ongoing measurement of the phase of B_s -> J/psi phi decay.

Primary author: Dr MIMURA, Yukihiro (Texas A&M University)

Presenter: Dr MIMURA, Yukihiro (Texas A&M University)

Session Classification: Plenary Talks

Contribution ID: **61** Type: **not specified**

Differentiating Neutrino Models on the Basis of the Reactor Angle and Lepton Flavor Violation

Monday, 17 December 2007 14:00 (50 minutes)

An earlier survey of viable neutrino mass and mixng models revealed a broad spectrum of predicted valies for sinˆ2 (theta_13) ranging fom the present upper bound of 0.04 accessible to the next round of reactor neutrino experiments down to values less than 0.001 requiring a neutrino factory for observation. Here we single out models with similar theta _13 predictions ad show that the viability of each type can be further differentiated according to their predictions for the l_j to l_i lepton flavor-violating branching ratos for various of the CMSSM parameters. Thi study supplements previous results obtained on the theta_13 - lepon flavor violation connection which involked restrictions on the class of SUSY GUT seesaw models considered.

Primary author: Prof. ALBRIGHT, Carl. H. (Northern Illinois University and Fermilab)

Presenter: Prof. ALBRIGHT, Carl. H. (Northern Illinois University and Fermilab)

Session Classification: Plenary Talks

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

Nucleon sigma term from lattice QCD

Monday, 17 December 2007 14:50 (50 minutes)

There has been renewed interest in the nucleon sigma term - the scalar form factor of the nucleon at zero recoil- since it determines the dark matter reaction rate with nucleon through the t-channel Higgs boson exchange. Despite its importance and its long history of theoretical studies, there are still substantial uncertanties. We present our recent studies of the nucleon sigma term based on the JLQCD project of Nf=2 unquenched lattice QCD simulation with dynamical overlap fermion.

Primary author: Prof. ONOGI, Tetsuya (YITP, Kyoto University)

Presenter: Prof. ONOGI, Tetsuya (YITP, Kyoto University)

Session Classification: Plenary Talks

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

”TBA”

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

Proton decay in SO(10) with stabilized doublet-triplet splitting

Monday, 17 December 2007 16:10 (50 minutes)

Primary author: Prof. BABU, Kaladi. S. (Oklahoma State University)

Presenter: Prof. BABU, Kaladi. S. (Oklahoma State University)

Session Classification: Plenary Talks

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

New Physics in Colliders

Primary author: Dr OKADA, Nobuchika (KEK)

Presenter: Dr OKADA, Nobuchika (KEK)

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

Proton Decay and Flavor Violating Thresholds in SO(10) Models

Tuesday, 18 December 2007 09:50 (50 minutes)

Discovery of neutrino mass has put the spotlight on supersymmetric SO(10) as a natural candidate for grand unification of forces and matter. However, the suppression of proton decay is a major problem in any supersymmetric grand unified models. In this paper we show how to alleviate this problem by simple threshold effect which raises the colored Higgsino masses and the grand unification scale to \gtrsim 10ˆ{17} GeV. There exist only four types of fields arising from different SO(10) representations which can generate this kind of threshold effects. Some of these fields also generate a sizable flavor violation in the quark sector compared to the lepton sector. The b-\tau unification can work in these types of models even for intermediate values of tan\beta.

Primary author: Dr MIMURA, Yukihiro (Texas A&M University)

Presenter: Dr MIMURA, Yukihiro (Texas A&M University)

Session Classification: Plenary Talks

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

Can the extra dimension rescue the SO(10) GUT?

Primary author: Prof. FUKUYAMA, Takeshi (Ritsumeikan University)

Presenter: Prof. FUKUYAMA, Takeshi (Ritsumeikan University)

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

String compactification and unification of forces

Tuesday, 18 December 2007 11:10 (50 minutes)

Primary author: Prof. KIM, Jihn. E. (Seoul National University)

Presenter: Prof. KIM, Jihn. E. (Seoul National University)

Session Classification: Plenary Talks

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

Three family GUT-like models from heterotic string

Tuesday, 18 December 2007 12:00 (20 minutes)

We recently developed string compactification on non-factorizable orbifold. Especially in E8xE8 Heterotic string, we obtain SU(5) and SO(10) GUT-like models with simple assumptions. These models have simple spectra including three generations of matter and messenger-like sectors.

Primary author: Mr TAKAHASH, Kei-Jiro (Kyoto University)

Presenter: Mr TAKAHASH, Kei-Jiro (Kyoto University)

Session Classification: Plenary Talks

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

CP and SUSY breaking and E6 GUT

Tuesday, 18 December 2007 14:00 (50 minutes)

Primary author: Prof. MAEKAWA, Nobuhiro (Nagoya University)

Presenter: Prof. MAEKAWA, Nobuhiro (Nagoya University)

Session Classification: Plenary Talks

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

Scalar non-degeneracy and flavor unification

Tuesday, 18 December 2007 14:50 (20 minutes)

A general consequence of GUT is unification of flavor. It is shown that the non-degeneracy of scalar superparticles provides a direct imprint of flavor structure in high-energy fundamental theory.

Primary author: Mr KOJIMA, Kentaro (Kyusyu University)

Presenter: Mr KOJIMA, Kentaro (Kyusyu University)

Session Classification: Plenary Talks

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

”TBA”

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

Gauge-Higgs Unification

Tuesday, 18 December 2007 15:40 (50 minutes)

Primary author: Prof. HOSOTANI, Yutaka (Osaka University)

Presenter: Prof. HOSOTANI, Yutaka (Osaka University)

Session Classification: Plenary Talks

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

Towards a Realistic Grand Gauge-Higgs Unification

Tuesday, 18 December 2007 16:30 (20 minutes)

We investigate a 5D SU(6) grand gauge-Higgs unification model compactified on an orbifold Sˆ1/Z_2. Ordinary quarks and leptons, together with right-handed neutrinos, are just accommodated into a minimal set of representations of the gauge group, without introducing any exotic states. The proton decay turns out to be forbidden at least at the tree level. We also find a correct electroweak symmetry breaking SU(2)*L \times U(1)_Y \to U(1)*{em} is easily realized by introducing suitable number of adjoint fermions.

Primary author: Dr MARU, Nobuhito (Kobe University)

Presenter: Dr MARU, Nobuhito (Kobe University)

Session Classification: Plenary Talks

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

Search for a realistic orbifold grand unification

Tuesday, 18 December 2007 16:50 (50 minutes)

Primary author: Prof. KAWAMURA, Yoshiharu (Shinshu University)

Presenter: Prof. KAWAMURA, Yoshiharu (Shinshu University)

Session Classification: Plenary Talks

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

Higgsless breaking of Grand Unification

Wednesday, 19 December 2007 09:50 (20 minutes)

We consider a possibility of higgsless breaking of the grand unified symmetry. In contrast with the orbifold breaking, the rank can be reduced in this breaking. We apply this breaking to a 5D SO(10) model.

Primary author: Dr YAMASHITA, Toshifumi (Osaka University)

Presenter: Dr YAMASHITA, Toshifumi (Osaka University)

Session Classification: Plenary Talks

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

Probing Unification Scale Physics at TeV-scale Collider Experiments

Wednesday, 19 December 2007 09:00 (50 minutes)

Grand Unification and seesaw mechanism of neutrino mass are physics at extremely high energies, which may not allow for direct experimental tests. Here I will discuss how we may obtain information about such extreme high energy physics based on TeV-scale collider data, such as LHC and ILC.

Primary author: Prof. MURAYAMA, Hitoshi (University of California, Berkeley and Institute for the Physics and Mathematics of the Universe, University of Tokyo)

Presenter: Prof. MURAYAMA, Hitoshi (University of California, Berkeley and Institute for the Physics and Mathematics of the Universe, University of Tokyo)

Session Classification: Plenary Talks

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

SUSY and Cosmology – inflation, gravitino, and axion

Wednesday, 19 December 2007 11:00 (50 minutes)

Primary author: Prof. KAWASAKI, Masahiro (ICRR, University of Tokyo)

Presenter: Prof. KAWASAKI, Masahiro (ICRR, University of Tokyo)

Session Classification: Plenary Talks

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

”TBA”

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

”TBA”

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

”TBA”

Primary author: Prof. SHAFI, Qaisar (Bartol Research Institute and Delaware University)

Presenter: Prof. SHAFI, Qaisar (Bartol Research Institute and Delaware University)

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

”TBA”

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

discussion

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

A three Site Higgsless Model

Wednesday, 19 December 2007 10:10 (20 minutes)

Primary author: Dr KURACHI, Masafumi (YITP, Kyoto University)

Presenter: Dr KURACHI, Masafumi (YITP, Kyoto University)

Session Classification: Plenary Talks

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

Building a model by coset space dimensional reduction using 10 dimensional coset spaces

Tuesday, 18 December 2007 17:40 (20 minutes)

Most of the free parameters in the SM are contained in the Higgs potential terms and the Yukawa coupling terms, i.e the Higgs associated terms. This fact suggests that if the origin of the Higgs particle results in a more fundamental model, this model would be described by fewer free parameters. One of the candidates of the model that gives origin of the Higgs particles is a gauge-Higgs unification model. Among these ideas we are interested in gauge-Higgs unification models based on the coset space dimensional reduction(CSDR) scheme. In CSDR, we assume the fundamental model is gauge theory in higher dimensional space-time that has extra dimensions of coset space structure. we investigate models based on CSDR scheme using 10 dimensional coset spaces.

Primary author: Mr NOMURA, Takaaki (Saitama University)

Presenter: Mr NOMURA, Takaaki (Saitama University)

Session Classification: Plenary Talks

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

How to Evade a NO-GO Theorem in Flavor Symmetries

Monday, 17 December 2007 17:50 (30 minutes)

We may expect that an approach based on symmetries will be a powerfulinstrument for investigating the origin of the flavors. However, when we want to introduce a symmetry (discrete one, U(1), and any others) into our mass matrix model, we always encounter an obstacle, the so-called No-Go theorem in flavor symmetries (YK, Phys.Rev. D71 (2005) 016010). In the present talk, I would like to talk about how to evade this No-Go theorm in order to build a realistic mass matrix model. I will suggest three ways to evade the theorem.

Primary author: Prof. KOIDE, Yoshio (Osaka University)

Presenter: Prof. KOIDE, Yoshio (Osaka University)

Session Classification: Plenary Talks

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

Unparticle Dark Matter

Monday, 17 December 2007 12:10 (20 minutes)

Once a parity is introduced in unparticle physics, under which unparticle provided in a hidden conformal sector is odd while all Standard Model particles are even, unparticle can be a suitable candidate for the cold dark matter (CDM) in the present universe through its coupling to the Standard Model Higgs doublet. We find that for Higgs boson mass in the range, 114.4 GeV < m_h < 250 GeV, the relic abundance of unparticle with mass 50 GeV < m_U < 80 GeV can be consistent with the currently observed CDM density. In this scenario, Higgs boson with mass m_h < 160 GeV dominantly decays into a pair of unparticles and such an invisible Higgs boson may be discovered in future collider experiments.
Ref.: e-Print: arXiv:0711.1506 [hep-ph]

Primary author: Dr KIKUCHI, Tatsuru (KEK)

Presenter: Dr KIKUCHI, Tatsuru (KEK)

Session Classification: Plenary Talks

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

Inflation and Unification

Wednesday, 19 December 2007 11:50 (50 minutes)

Primary author: Prof. SHAFI, Qaisar (Bartol Research Institute and Delaware University)

Presenter: Prof. SHAFI, Qaisar (Bartol Research Institute and Delaware University)

Session Classification: Plenary Talks

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

Gauge unification in 5-D SU(5) model with orbifold breaking of GUT symmetry

Tuesday, 18 December 2007 18:00 (30 minutes)

We consider a 5-dimensional SU(5) model wherein the symmetry is broken to the 4-dimensional Standard Model by compactification of the 5th dimension on an Sˆ1/(Z_2 imes Zˆprime_2) orbifold. We identify the members of all SU(5) representations upto 75 which have zero modes. We examine how these light scalars affect gauge coupling unification assuming a single intermediate scale and present several acceptable solutions. The 5-D compactification scale coincides with the unification scale of gauge couplings and is determined via this renormalization group analysis. When SO(10) is considered as the GUT group there are only two solutions, so long as a few low dimensional scalar multiplets upto 126 are included.

Primary author: Prof. BRAHMACHARI, Biswajoy (Vidyasagae Evening College)

Presenter: Prof. BRAHMACHARI, Biswajoy (Vidyasagae Evening College)

Session Classification: Plenary Talks

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

Gauge unification in 5-D SU(5) model with orbifold breaking of GUT symmetry

We consider a 5-dimensional SU(5) model wherein the symmetry is broken to the 4-dimensional Standard Model by compactification of the 5th dimension on an Sˆ1/(Z_2 imes Zˆprime_2) orbifold. We identify the members of all SU(5) representations upto 75 which have zero modes. We examine how these light scalars affect gauge coupling unification assuming a single intermediate scale and present several acceptable solutions. The 5-D compactification scale coincides with the unification scale of gauge couplings and is determined via this renormalization group analysis. When SO(10) is considered as the GUT group there are only two solutions, so long as a few low dimensional scalar multiplets upto 126 are included.

Primary author: Prof. BRAHMACHARI, Biswajoy (Vidyasagae Evening College)

Presenter: Prof. BRAHMACHARI, Biswajoy (Vidyasagae Evening College)

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

Family Symmetry and GUTs

Tuesday, 18 December 2007 09:00 (50 minutes)

Primary author: Prof. KING, Steve. F. (University of Southampton)

Presenter: Prof. KING, Steve. F. (University of Southampton)

Session Classification: Plenary Talks

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

New Physics in Colliders

Monday, 17 December 2007 17:00 (50 minutes)

Primary author: Dr OKADA, Nobuchika (KEK)

Presenter: Dr OKADA, Nobuchika (KEK)

Session Classification: Plenary Talks