

Non-perturbative Renormalization Group and Dynamical Problems in Particle Physics

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2004 Fiscal Year Final Research Report Summary

Non-perturbative Renormalization Group and Dynamical Problems in Particle Physics

Research Project

Project/Area Number

13640272

Research Category

Grant-in-Aid for Scientific Research (C)

Allocation Type

Single-year Grants

Section

一般

Research Field

素粒子・核・宇宙線

Research Institution

Kanazawa University

Principal Investigator

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Project Period (FY)

2001 – 2004

Keywords

Renormalization Group / Supersymmetry / Mass Hierarchy

Research Abstract

Many problems in the particle Physics are attribute to hierarchical structures and/or unnatural sizes of the parameters. The most frequently used approaches for this kind problem is to introduce some symmetries explaining the bulk structure and their suitable breaking parameters. However hierarchical parameters can be realized through large radiative corrections in the long range scales. In this research, I mainly study several typical problems in particle physics with hierarchical parameters from this point of view. For these studie, the renormalization group is a very useful framework and I also aimed to develop a kind of non-perturbative renormalization group equations for supersymmetric field theories.

Among many problems, I considered especially the dynamical origins for the hierarchical structures of the quark and lepton mass matrices and also the universal structure of masses expected for the supersymmetric partners in various situations. Through many collaborations, we found a sort of supersymmetric models with superconformal field theories inducing large anomalous dimensions to the quark and lepton superfield to realize the above mass structures. We also pointed out that the expected mass structure for the supersynnetric partners can be naturally realized, if the grand unified theory is given with an extra-dimensional space-time. In addition, we considered a new type of scenarios for solving the supersymmetric little hierarchy problem by applying the nature of the superconformal dynamics. Studies of this direction are continued and developed further at present.

Research Products (28 results)

All	2005	2004	2003	2002	2001
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All	Journal Article
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- [Journal Article] Large Mass Scale by Strong Gauge Dynamics with Infrared Fixed Point 2005 ▾
- [Journal Article] Democratic mass matrices induced by strong gauge dynamics and large mixing angles for leptons 2005 ▾
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- [Journal Article] Democratic mass matrices induced by strong gauge dynamics and large mixing angles for leptons 2005 ▾
- [Journal Article] Softening the Supersymmetric Flavor Problem in Orbifold GUTs 2004 ▾
- [Journal Article] Suppressed supersymmetry breaking terms in the Higgs sector 2004 ▾
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- [Journal Article] Suppressed supersymmetry breaking terms in the Higgs sector 2004 ▾
- [Journal Article] Yukawa Hierarchy Transfer Based on Superconformal Dynamics and Geometrical Realization in String Models 2003 ▾
- [Journal Article] Flavor violation in supersymmetric theories with gauged flavor symmetries 2003 ▾
- [Journal Article] Exact S_3 symmetry solving the supersymmetric flavor problem 2003 ▾
- [Journal Article] Yukawa Hierarchy Transfer Based on Superconformal Dynamics and Geometrical Realization in String Models 2003 ▾
- [Journal Article] Flavor violation in supersymmetric theories with gauged flavor symmetries 2003 ▾
- [Journal Article] Exact S_3 symmetry solving the supersymmetric flavor problem 2003 ▾
- [Journal Article] Yukawa Hierarchy Transfer from Superconformal Sector and Degenerate Sfermion Masses 2002 ▾
- [Journal Article] More about Kaluza-Klein Regularization 2002 ▾
- [Journal Article] Non-Perturbative Renormalization Group Analysis in Quantum Mechanics 2002 ▾
- [Journal Article] Sfermion Mass Degeneracy, Superconformal Dynamics and Supersymmetric Grand Unified Theories 2002 ▾
- [Journal Article] Suppressing FCNC and CP-Violating Phases by Extra Dimensions 2002 ▾
- [Journal Article] Yukawa Hierarchy Transfer from Superconformal Sector and Degenerate Sfermion Masses 2002 ▾
- [Journal Article] More about Kaluza-Klein Regularization 2002 ▾
- [Journal Article] Non-Perturbative Renormalization Group Analysis in Quantum Mechanics 2002 ▾
- [Journal Article] Sfermion Mass Degeneracy, Superconformal Dynamics and Supersymmetric Grand Unified Theories 2002 ▾
- [Journal Article] Suppressing FCNC and CP-Violating Phases by Extra Dimensions 2002 ▾
- [Journal Article] ERG and Schwinger-Dyson Equations - Comparison in formulations and applications - 2001 ▾
- [Journal Article] Sfermion masses in Nelson-Strassler type of models : SUSY standard models coupled with SCFTs 2001 ▾

[Journal Article] ERG and Schwinger-Dyson Equations -Comparison in formulations and applications-

2001 ▾

[Journal Article] Sfermion masses in Nelson-Strassler type of models : SUSY standard models coupled with SCFTs

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