

# Development and Application of Non-Perturbative Method to Analyze Gauge Field Theories

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# 2006 Fiscal Year Final Research Report Summary

## Development and Application of Non-Perturbative Method to Analyze Gauge Field Theories

Research Project

### Project/Area Number

13135211

### Research Category

Grant-in-Aid for Scientific Research on Priority Areas

### Allocation Type

Single-year Grants

### Review Section

Science and Engineering

### Research Institution

Kanazawa University

### Principal Investigator

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### Co-Investigator(Kenkyū-buntansha)

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### Project Period (FY)

2001 - 2006

### Keywords

non-perturbative method / gauge theory / renormalization group / spontaneous symmetry breaking / soliton / skyrmion / hierarchy problem / higgs particle

### Research Abstract

K-I. A studied the non-perturbative renormalization group method to investigate the dynamical chiral symmetry breaking in gauge theories. The mean field method so far like the Schwinger-Dyson equation suffers a serious gauge dependence. The non-perturbative renormalization group beta functions can be improved to give less gauge dependent physical results by taking account of non-ladder type diagrams. The chiral phase structures in the hot and dense QCD matter is a hot topic in the high energy physics and nuclear physics, and the non-perturbative renormalization group beta function in the hot and dense states are evaluated and the importance of the effective potential and the Lorentz non-invariant operators are found. Also, the infinite range interactions are studied with the simplest Ising model. Introducing a new method of finite range scaling, we evaluate the critical coupling constant and the exponent by referring to the zeta function.

M. H investigated Skyrme model and Fadeev model ... More

# Research Products (54 results)

All	2006	2005	2004	2003	2002	2001
				All	Journal Article	

[Journal Article] Fine-tuning in the gauge Mediated supersymmetry breaking models and the induced top Yukawa coupling **2006** ▾

[Journal Article] Dynamical realization of democratic Yukawa matrices and alignment of A-terms **2006** ▾

[Journal Article] Estimation of the Lin-Yan bound of the least static energy of the Faddeev model **2006** ▾

[Journal Article] Restricting profile function of hedgehog Skyrmon **2006** ▾

[Journal Article] Domain wall solution of the Skyrme model **2006** ▾

[Journal Article] Fine-tuning in the gauge mediated supersymmetry breaking models and the induced top Yukawa coupling **2006** ▾

[Journal Article] Dynamical realization of democratic Yukawa matrices and alignment of A-terms **2006** ▾

[Journal Article] Estimation of the Lin-Yan bound of the least static energy the Faddeev model **2006** ▾

[Journal Article] Restricting profile function of hedgehog Skyrmon **2006** ▾

[Journal Article] Domain wall solution of the Skyrme model **2006** ▾

[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** ▾

[Journal Article] Induced top Yukawa coupling and suppressed Higgs mass parameters **2005** ▾

[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** ▾

[Journal Article] Induced top Yukawa coupling and suppressed Higgs mass parameters **2005** ▾

[Journal Article] Softening the Supersymmetric Flavor Problem in Orbifold GUTs **2004** ▾

[Journal Article] Suppressed supersymmetry breaking terms in the Higgs sector **2004** ▾

[Journal Article] Class of exact solutions of the Faddeev model **2004** ▾

[Journal Article] Decomposition of meron configuration of SU(2)gauge field **2004** ▾

[Journal Article] Softening the Supersymmetric Flavor Problem in Orbifold GUTs **2004** ▾

[Journal Article] Suppressed supersymmetry breaking terms in the Higgs sector **2004** ▾

[Journal Article] Class of exact solutions of the Faddeev model **2004** ▾

[Journal Article] Decomposition of meron configuration of SU(2) gauge field **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 S3 symmetry solving the supersymmetric flavor problem **2003** ▾

[Journal Article] Elliptic solutions of the Skyrme model	<b>2003</b> ▾
[Journal Article] Non-perturbative renormalization group analysis of the Ohmic quantum dissipation	<b>2003</b> ▾
[Journal Article] Yukawa Hierarchy Transfer Based on Superconformal Dynamics and Geometrical Realization in String Models	<b>2003</b> ▾
[Journal Article] Flavor violation in supersymmetric theories with gauged flavor symmetries	<b>2003</b> ▾
[Journal Article] Exact $S_3$ symmetry solving the supersymmetric flavor problem	<b>2003</b> ▾
[Journal Article] Non-perturbative renormalization group analysis of the Ohmic quantum dissipation	<b>2003</b> ▾
[Journal Article] Yukawa Hierarchy Transfer from Superconformal Sector and Degenerate Sfermion Masses	<b>2002</b> ▾
[Journal Article] More about Kaluza-Klein Regularization	<b>2002</b> ▾
[Journal Article] Sfermion Mass Degeneracy, Superconformal Dynamics and Supersymmetric Grand Unified Theories	<b>2002</b> ▾
[Journal Article] Suppressing FCNC and CP-Violating Phases by Extra Dimensions	<b>2002</b> ▾
[Journal Article] Nonlinear Sigma Models solvable by the Aratyn-Ferreira-Zimmerman ansatz	<b>2002</b> ▾
[Journal Article] Class of exact solutions of the Skyrme and the Faddeev models	<b>2002</b> ▾
[Journal Article] Non-Perturbative Renormalization Group Analysis in Quantum Mechanics	<b>2002</b> ▾
[Journal Article] Nonperturbative renormalization group approach for Quantum dissipative systems	<b>2002</b> ▾
[Journal Article] Yukawa Hierarchy Transfer from Superconformal Sector and Degenerate Sfermion Masses	<b>2002</b> ▾
[Journal Article] More about Kaluza-Klein Regularization	<b>2002</b> ▾
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[Journal Article] Nonlinear sigma models solvable by the Aratyn-Ferreira-Zimmerman ansatz	<b>2002</b> ▾
[Journal Article] Non-Perturbative Renormalization Group Analysis in Quantum Mechanics	<b>2002</b> ▾
[Journal Article] Nonperturbative renormalization group approach for quantum dissipative systems	<b>2002</b> ▾
[Journal Article] Dynamical Symmetry Breaking in QED3 from the Wilson RG Point of View	<b>2001</b> ▾
[Journal Article] ERG and Schwinger-Dyson Equations - Comparison in formulations and applications -	<b>2001</b> ▾
[Journal Article] Sfermion masses in Nelson-Strassler type of models : SUSY standard models coupled with SCFTs	<b>2001</b> ▾
[Journal Article] Dynamical Symmetry Breaking in QED <sub>3</sub> from the Wilson RG Point of View	<b>2001</b> ▾
[Journal Article] ERG and Schwinger-Dyson Equations - Comparison in formulations and applications -	<b>2001</b> ▾
[Journal Article] Sfermion masses in Nelson-Strassler type of models : SUSY standard models coupled with SCFTs	<b>2001</b> ▾

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