List of Poster Presentations

1. COPINGER Patrick (University of Tokyo)
"Dynamically Assisted Chiral Magnetic Effect"

Abstract:

Field configurations that yield dynamically supported pair production and also admit finite topological charge are investigated. The Worldline instanton technique is applied to select space-time components in parallel electric and magnetic fields. The chiral magnetic effect is found as a natural consequence of chirality generation in the presence of a magnetic field. Not only pair production but also the chiral magnetic current is enhanced. Implications for Dirac semimetal testing are also discussed.

2. FUKUDA Masayuki (University of Tokyo)
"SH^c Realization of Minimal Model CFT: Triality, Poset and Burge Condition"

Abstract:

Recently an orthogonal basis of $\mathcal{W}_N$-algebra (AFLT basis) labeled by N-tuple Young diagrams was found in the context of 4D/2D duality. Recursion relations among the basis are summarized in the form of an algebra SH^c which is universal for any N. We show that it has an $\mathscr{S}_3$ automorphism which is referred to as triality. We study the level-rank duality between minimal models, which is a special example of the automorphism. It is shown that the nonvanishing states in both systems are described by N or M Young diagrams with the rows of boxes appropriately shuffled. The reshuffling of rows implies there exists partial ordering of the set which labels them. For the simplest example, one can compute the partition functions for the partially ordered set (poset) explicitly, which reproduces the Rogers-Ramanujan identities. We also study the description of minimal models by SH^c. Simple analysis reproduces some known properties of minimal models, the structure of singular vectors and the N-Burge condition in the Hilbert space.

3. HASEGAWA Chika (Rikkyo University)
"Extremal Surfaces in Asymptotic AdS Black Hole and Holographic Entanglement Entropy"

Abstract:

We study AdS/CFT correspondence by calculating holographic entanglement entropy.

We calculated extremal (and/or minimal) surface in asymptotically AdS black hole solution in 2+1 dimensional space-time and 3+1 dimensional space-time especially. Then, we considered them from the point of view of both entanglement entropy and black hole entropy. As a result, we reconfirmed that each viewpoints satisfy qualitative consistency and quantitative consistency in 2+1 dimensional space-time. Moreover, we will check in 3+1 dimensional space-time similarly. This talk presentation is based on our work in progress, which is collaborating with my supervisor, T. Eguchi.

4. HOMMA Yoshinori (Univ. of Leipzig GERMANY)
"Open Mirror Symmetry for Higher Dimensional Calabi–Yau Hypersurfaces"

Abstract:

Compactifications with fluxes and branes motivate us to study various enumerative invariants of Calabi-Yau manifolds. In this presentation, we study non-perturbative corrections depending on both open and closed string moduli for a class of compact Calabi-Yau manifolds in general dimensions. Our analysis is based on the methods using relative cohomology and generalized hypergeometric system. For the simplest example of compact Calabi-Yau fivefold, we explicitly derive the associated Picard-Fuchs differential equations and compute the quantum corrections in terms of the open and closed flat coordinates. Implications for a kind of open-closed duality are also discussed.

5. HOSHINO Hironori (Chuo University)
"Drift velocity of nonequilibrium steady state in AdS/CFT"

Abstract:

We study the drift velocity of charged particles in nonequilibrium steady states by using the anti-de Sitter spacetime/conformal field theory (AdS/CFT) correspondence. We consider nonequilibrium systems with a constant flow of current along an electric field, in which the current is carried by both the doped charges and those pair created by the electric field. The average velocity of the particles and anti-particles is derived from analysis of the fluctuations of a D-brane. This relation is a new dictionary of the AdS/CFT correspondence.

6. HOTTA Kenji (Hokkaido Univ.)
"Thermal Vacuum State for Multiple Closed Superstrings in the Framework of Thermo Field Dynamics"

Abstract:

Although the finite temperature systems of strings have been mainly examined in the framework of Matsubara formalism, quite a few works have been done to investigate these systems in the framework of thermo field dynamics. Previously we have calculated the thermal vacuum state and the partition function for a single closed superstring in the framework of thermo field dynamics. From this we can reproduce the free energy for multiple strings in the case of Matsubara method. However it is unsatisfactory to derive free energy in such a way, since the free energy for multiple strings should be obtained by only calculating the expectation value of the corresponding operator in the thermal vacuum state. In this talk, we compute the thermal vacuum state for multiple closed superstrings based on free light-cone superstring field theory. From this we can reproduce the free energy for closed superstrings in the case of Matsubara method. We coment on the relation between this closed superstrings at finite temperature and the open superstrings on D9-brane--anti-D9-brane pairs.

7. KAGIMURA Aya (Osaka University)
Bosonization approach for atomic collapse "in graphene"

Abstract:

Around a large charge with atomic number $Z > 137$, the QED vacuum is expected to collapse due to the strong Coulombic force. While the relativistic quantum mechanics fails to make reliable predictions for the fate of the vacuum, the heavy ion collision experiment also does not give clear understanding of this system.

Recently, the atomic collapse" resonances were observed on graphene where an artificial nuclei can be made.

In this poster, I will present our non-perturbative study of the vacuum strucutre which contains multi-body effect using bosonization method.

8. KAWAMOTO Shoichi (Chung Yuan Christian Univ. TAIWAN)
"Size scaling of self gravitating polymers and strings"

Abstract:

In this presentation, we show that a long string with self-gravitational and -repulsive interactions exhibits various size scalings with respect to the strength of the interactions. The profile of the string is described by an interacting random walk, which is used also as a model of polymers. We employ tools developed in polymer physics to analyze the size behavior and summarize results in diagrams in the space of the coupling constants.

9. KIKUCHI Ken (Nagoya University)
"AdS/CFT and local renormalization group with gauge fields"

Abstract:

A quantity called vector beta function has become to known in the context of local renormalization group (LRG). Since the function does not appear in the ordinary quantum field theories (QFTs), it is difficult to deal with and its properties are poorly understood. Hence we tried to study its properties from the bulk side via AdS/CFT correspondence, rather than to tackle the problem directly in QFTs. As a result, we found that the vector beta function satisfies some suggested properties. We also gained some insight into the a-theorem.

10. KYONO Hideki (Kyoto University)
"Lax pairs on Yang-Baxter deformed backgrounds"

Abstract:

We explicitly derive Lax pairs for string theories on various Yang-Baxter deformed backgrounds. Then we can find out a concise derivation of Lax pairs based on simple replacement rules. Furthermore, each of the above deformations can be reinterpreted as a twisted periodic boundary conditions with the undeformed background by using the rules. This talk is based on the work with T. Kameyama, J. Sakamoto, and K. Yoshida; arXiv/hep-th:1509.00173.

11. LAJKO Miklos (University of Tokyo)
"Chiral phases of SU(N) fermionic Mott insulators"

Abstract:

With the recent progress towards achieving SU(N) symmetry with ultra-cold fermionic atoms [1] the investigation of the effective SU(N) Heisenberg model on various

one-dimensional and two-dimensional lattices has become a very active field of research. Several remarkable ground state properties have been reported, including long-range color order [2], algebraic correlations [3], and valence-bond solid states in which groups of N atoms form local singlets on N-site plaquettes resulting in a ground state that breaks translational symmetry [4]. Quite unique is the proposal of a chiral ground state, suggested by Hermele et al. [5], predicting the appearance of Abelian chiral spin liquid phases for a special large N limit, where the ratio of N and the particle filling is kept constant.

We show that such chiral phases appear in the triangular lattice in the one fermion per site case in the presence of an artifical gauge field. This is demonstrated for values of N ranging from 3 to 9 by an extensive study using exact diagonalizations and Gutzwiller projected wave functions of the third-order effective model of the Mott-insulating limit. The parton construction is based on a set of N Gutzwiller projected fermionic wave-functions with flux π/N per triangular plaquette that emerge naturally from varying the boundary conditions of the Hofstadter Hamiltonian. This construction is shown to agree remarkably well with exact results.

References:

1. C. Wu, J.-p. Hu, and S.-c. Zhang, Phys. Rev. Lett. 91, 186402 (2003), A. V. Gorshkov, et al., Nat Phys 6, 289 (2010).

2. T. Toth, A. M. Laeuchli, F. Mila, and K. Penc, Phys. Rev. Lett. 105, 265301 (2010).

3. P. Corboz, M. Lajk, A. M. Laeuchli, K. Penc, and F. Mila, Phys. Rev. X 2, 041013 (2012).

4. P. Corboz, M. Lajk, K. Penc, F. Mila, and A. M. Laeuchli, Phys. Rev. B 87, 195113 (2013).

5. M. Hermele, V. Gurarie, and A. M. Rey, Phys. Rev. Lett. 103, 135301 (2009).

12. MIWA Akitsugu (Nihon University)
"On quantum corrections of a string world sheet in the AdS/CFT correspondence"

Abstract:

We discuss approaches to taking account of quantum corrections of a string world sheet dual to a Wilson loop operator in the AdS/CFT correspondence.

13. MORI Hironori (Osaka University)
"Superconformal index on RP2xS1 and mirror symmetry 2"

Abstract:

We study Abelian mirror symmetry with many flavors and the insertions of Wilson loops and vortex loops by utilizing the RP^2xS^1 index formula. The key identity making the above description work well is the mode 2 version of the Fourier analysis. We study such Z_2-structure and the S-operation, as an application, in the context of a SL(2,Z) action on 3d superconformal field theories. We observe that two types of the parity conditions basically associated with gauge symmetries which we call P-type and CP-type are interchanged under mirror symmetry.

14. NISHIDA Mitsuhiro (Osaka Universty)
"Entanglement negativity of a free massless Dirac fermion on 2d torus"

Abstract:

Entanglement negativity is one of entanglement measures such as mutual information. We study the entanglement negativity of a free massless Dirac fermion on 2d torus by bosonization. Our result from two-point function is consistent with the result on 2d flat spacetime and Renyi entropy. We also discuss the entanglement negativity of mixed states.

15. OKUNO Shizuka (Shizuoka University)
"Entanglement entropy in field theory on fuzzy sphere"

Abstract:

We study entanglement entropy on the fuzzy sphere. We calculate it in a scalar field theory on the fuzzy sphere, which is given by a matrix model. We use a method that is based on the replica method and applicable to interacting fields as well as free fields. For free fields, we obtain the results consistent with the previous study, which serves as a test of the validity of the method. For interacting fields, we perform Monte Carlo simulations at strong coupling and see a novel behavior of entanglement entropy.

16. SAKAMOTO Junichi (Kyoto University)
"Yang-Baxter deformations of Minkowski spacetime"

Abstract:

We introduce Yang-Baxter deformations of 4D Minkowski spacetime. The Yang-Baxter sigma model description was originally developed for principal chiral models based on a modified classical Yang-Baxter equation. It has been extended to coset curved spaces and models based on the usual classical Yang-Baxter equation. It would be very interesting to generalize deformations of this type to the case of flat space. However, for flat space, there is the obvious problem that the standard bilinear form degenerates if we employ the familiar coset Poincar¥'e group/Lorentz group. Instead we consider a slice of AdS_5 by embedding the 4D Poincae group into the 4D conformal group SO(2,4). With this procedure we obtain metrics and B-fields as Yang-Baxter deformations which correspond to well-known configurations such as T-duals of Melvin backgrounds,Spradlin-Takayanagi-Volovich backgrounds, pp-waves,and T-duals of dS_4 and AdS_4.(arXiv:1505.04553)

17. SANNOMIYA Noriaki (University of Tokyo)
"Supersymmetry breaking and Goldstone fermions in an extended Nicolai model"

Abstract:

We introduce and study a generalization of Nicolai's lattice model with supersymmetry (SUSY). The model describes interacting spinless fermions in one dimension. The Hamiltonian is built from two supercharges, each of which is comprised solely of fermion operators. Using a variety of techniques, we show that SUSY is spontaneously broken in this model and the low-energy excitations are described by gapless Dirac fermions.

18. SHIMIZU Kazuma (YITP, Kyoto)
"Large N behavior of Mass-deformed ABJM Theory"

Abstract:

We study the mass-deformed ABJM Theory in the large N limit. The exact partition function on S^3 can be written by the matrix model using localization technique. The large N behaviors are determined by saddle solution of saddle-point equation of the matrix model. We find new solution of the saddle-point equation. Then we compute the partition function and other quantities of the theory. Especially, we confirm the free

energy of the theory behaves $N^{3/2}$. This presentation is based on the collaboration with Seiji Terashima and Tomoki Nosaka.

19. SHIMODE Naoki (Hokkaido University)
"A Proposal of Arbitrary Higher-form Field Actions, Derived from Generalised Chern-Simons Action"

Abstract:

A series of actions and equations of motions for arbitrary higher form fields is proposed. This is achieved by a certain systematic procedure.   We will present how we have got those actions and e.o.m.s, using the object that is called Generalised Chern-Simons action.

20. SONODA Akihiko (Osaka University)
"Universal turbulence on branes in holography"

Abstract:

We are interested in a phase transition between a confining phase and a deconfining phase in strongly coupled gauge theories. At the phase transition, we found that the mesons at high excitation levels become turbulent in holographic QCD. The turbulent mesons have a power-law energy distribution as K. Hashimoto, S. Kinoshita, K. Murata and T. Oka already mentioned in their paper(arXiv:1408.6293 [hep-th]). In this talk, we explain that the turbulence power is universal, irrespective of how the transition is driven, by numerically calculating the power in various static brane setups at criticality. We also find that the power depends only on the codimension of the probe D-brane.

21. SUGIMOTO Yuji (Osaka University)
"The Enhancement of Supersymmetry in M-strings"

Abstract:

We study two M5 branes in A1 ALE space. We introduce some M2 branes suspended between the M5 branes. Then, the boundaries of M2 branes look like strings, called M strings.   We calculate the M strings partition function by using the refined topological vertex formalism. On the other hand, we calculate the elliptic genus of N=(4,4) gauge theory with the localization method. We find that, by setting some Kahler parameters, the $N = (4,4)$ elliptic genus agrees with the M strings partition function in some sectors.

22. SUGITA Kazuhiro (Nihon University)
"Singular Gauge Transformation and the Erler-Maccaferri Solution in Bosonic Open SFT"

Abstract:

We study multiple-brane solutions in bosonic open SFT. There are two types of such solutions, the pure-gauge-form solutions and the Erler-Maccaferri solutions. In the former solutions, the multiplicity is changed by singular gauge transformations, while in the latter ones, it is changed by bcc operators. We study solutions which are obtained from the Erler-Maccaferri solutions by singular gauge transformations.

23. TAKESUE Koki (Kitasato University)
"ADHM construction in eight dimension"

Abstract:

It is well known that ADHM construction can be produced four dimensional instantons which are satisfy self-duality relation. In higher dimensions, we can consider a higher dimensional "instanton" by generalize the self-duality relation in four dimensions. However, in eight dimensions, the case of charge one instanton was only known.

So we establish the eight dimensional ADHM construction and find explicit higher charge instantons. Furthermore, we consider the 4n dimensional ADHM constructions.

24. UMEDA Naoya (Kyoto University)
"Random volumes from matrices"

Abstract:

The worldvolume theory of membrane is equivalent to three-dimensional quantum gravity coupled to matter fields. We propose a new class of models which generate three-dimensional random volumes, where each Feynman diagram can be regarded as a collection of triangles glued with multiple hinges. The models can describe three-dimensional pure gravity by reducing the set of possible diagrams to that of tetrahedral decompositions of three-dimensional manifolds, and we show that various matter degrees of freedom can be assigned to each configuration.

25. WATANABE Noriaki (University of Tokyo, Kavli IPMU)
"On skein relations in class S theories"

Abstract:

Loop operators of a class S theory arise from networks on the corresponding Riemann surface, and their operator product expansions are given in terms of the skein relations, that we describe in detail in the case of class S theories of type A. The geometrical relations are expected to have a range of applications : the geometrical descriptions of OPE of loop operators (N=4 in particular), computations of the superconformal index of nontrivial network operators and descriptions of surface-line coupled systems in 4D. Most of the discussions are based on the joint work w/ Y.Tachikawa, 1504.00121.

26. YAMANAKA Masanori (Nihon University)
"Matrix model and random matrix theory analysis of protein"

Abstract:

Static and dynamical structures of protein is analyzed using the matrix model and the random matrix theory, respectively. Protein 3d structures registered in PDB [1] exceed 100,000 kinds and the detailed analysis becomes current problem. In this study, we classified the structure by genus of torus identifying the protein secondary structure with the Feynman diagram in the topological expansion of the matrix model [2]. Tens of thousands of protein in PDB was decomposed into the irreducible representation of knot and the appearance frequency of the representation is calculated. We found that the genus becomes an extensive quantity as a function of the molecular weight of the protein and that a characteristic scale exists in the irreducible representation. We discuss the correspondence to a classification by Penner who identify the secondary structure of the protein with the world sheet of the open string and consider the protein moduli [3]. Random matrix theory was applied to multivariate analysis of time series of the atomic coordinate obtained from molecular dynamics of protein [4]. The dynamical motion is decomposed to extended and localized modes which were extracted by introducing a statistical quantity, used in the Anderson localization problem, to a process in the principal component analysis. The eigenvalue of the first principal component diverges logarithmic as a function of the characteristic time scale which is a parameter analogous to N in the large-N expansion.

[1] PDB: Protein Data Bank: http://www.rcsb.org/pdb/

[2] Y.Miyazawa, S.Tanda, M.Yamanaka, preprint.

[3] R.C.Penner, et. al., Pure Appl. Math., 63, 1249 (2010).

[4] M.Yamanaka, JPSJ, 82, 083801 (2013) & 84, 063801 (2015).

27. YOKOKURA Yuki

(RIKEN iTHES)

"Thermodynamic entropy as a Noether invariant"

Abstract:

We study a classical many-particle system with an external control represented by a time-dependent extensive parameter in a Lagrangian. We show that thermodynamic entropy of the system is uniquely characterized as the Noether invariant associated with a symmetry for an infinitesimal non-uniform time translation, where trajectories in the phase space are restricted to those consistent with quasi-static processes in thermodynamics.

Reference: arXiv:1509.08943