Titles and abstracts of poster session

Tatsuo Azeyanagi (Kyoto University)

Title: Near extremal black hole entropy as entanglement entropy via AdS_2/CFT_1

Abstract: In this presentation, we derive the entropy of the (near) extremal black hole entropy as the entanglement entropy. In the near horizon limit of the (near) extremal black hole, AdS_2 geometry appears and the holographic description is available. Since AdS_2 geometry has two boundaries in which the conformal quantum mechanics lives we can consider the entanglement between these two boudaries. As a result, we see that the entanglement entropy reproduces the black hole entropy derived from Wald formula.

Yoichi Chizaki (Ochanomizu University)

Title: General Operator Solutions and BRST Quantization of Superstrings in the pp-Wave with Torsion

Abstract: We completely accomplish the canonically covariant quantization of Ramond-Neveu-Schwarz (RNS) superstrings in the pp-wave background with a non-zero flux of the NS-NS antisymmetric two-form field. Here this flux is equivalent to a nonvanishing torsion. In this quantization, general operator solutions, which satisfy the entire equation of motion and all the canonical (anti)commutation relations, play an important role. The whole of covariant string coordinates and fermions can be composed of free modes. Moreover, employing covariant free-mode representations, we calculate the anomaly in the super-Virasoro algebra and determine the number of dimensions of spacetime and the ordering constant from the nilpotency condition of the BRST charge in the pp-wave background with the flux.

Toshiaki Fujimori (Tokyo Institute of Thechnology)

Title: Domain walls with non-Abelian flavor symmetry

Abstract: Domain walls in gauge theory with non-Abelian flavor symmetry possess normalizable Nambu-Goldstone zero modes associated with spontaneously broken non-Abelian flavor symmetry. We construct the moduli space metric as the effective field theory of walls. The domain walls show some different properties from domain walls without non-Abelian symmetry due to the Nambu-Goldstone modes.

We focus on a particularly interesting model with $SU(N) \times SU(N) \times U(1)$ flavor symmetry. The effective field theory turns out to be the $GL(N, \mathbf{C})$ nonlinear sigma model on which the $SU(N) \times SU(N) \times \mathbf{C}^*$ isometry acts. In the case of $3 + 1$ dimensional world-volume, we can dualize these massless scalars to non-Abelian 2-form tensor fields, which give supersymmetric generalization of the Freedman-Townsend model.

Masashi Hamanaka (Nagoya university)
Title: Integrable Aspects of Noncommutative Anti-Self-Dual Yang-Mills Equations
Abstract: I would discuss some integrable aspects of noncommutative (NC) Anti-Self-Dual Yang-Mills (ASDYM) equations. In particular, I would present a Backlund transformation for NC ASDYM eq. which yields various exact (Atiyah-Ward ansatz) solutions including NC instantons and NC non-linear plane waves. We have found that a kind of NC determinants, the quasideterminants (for a good survey, see [Gelfand and Retakh et. al, arXiv:math/0208146]), play crucial roles in construction of solutions. This is based on collaboration with Claire R. Gilson and Jonathan J.C. Nimmo (Glasgow) [arXiv:0709.2069].

Yasuyuki Hatsuda (Department of Physics, Faculty of Science, University of Tokyo)
Title: Finite-size corrections to dyonic giant magnons
Abstract: We compute finite-size corrections to 2-spin giant magnons in two ways. One is to study an asymptotic behavior of "helical" string solutions of hep-th/0609026 as k goes to unity. The other is to apply generalized Luscher formula, which computes a leading finite-size correction to energy only from infinite-size information, to the case that incoming particles are boundstates. We compare these two results.

Hirotaka Hayashi (the University of Tokyo)
Title: Large winding sector of AdS/CFT
Abstract: Recently, there have been significant developments of the AdS/CFT correspondence, by approaches based on integrability. However, the study has so far focused on large spin sector, which is relatively near to BPS sector. In this presentation, we explore the opposite sector, farthest from BPS. We find a new family of classical oscillating strings with large winding numbers and we also discuss their gauge theory dual operators. This work is in collaboration with K. Okamura (U. of Tokyo), R. Suzuki (U. of Tokyo) and B. Vicedo (DAMTP Cambridge U.).

Kenji Hotta (Hokkaido University)
Title: Creation of D9-brane–anti-D9-brane Pairs from Hagedorn Transition of Closed Strings
Abstract: Atick and Witten have proposed the Hagedorn transition of closed strings via condensation of closed string winding tachyon in Matsubara formalism. But we have not known the stable minimum of this tachyon potential yet. On the other hand, we have previously shown that a phase transition occurs near the Hagedorn temperature and D9-brane–anti-D9-brane pairs become stable by calculating the free energy of open strings on these pairs. We present a conjecture that D9-brane–anti-D9-brane pairs are created by

the Hagedorn transition of closed strings. We will show that, near the Hagedorn temperature, the potential energy at the open string vacuum is lower than that of closed string vacuum, and that the free energy of open strings near the closed string vacuum is similar to the propagator of 'winding tachyon'.

Shoichi Ichinose (University of Shizuoka)
Title:Casimir Energy of 5D Electro-Magnetrism and Sphere Lattice Regularization
Abstract: We examine the Casimir energy of 5D electro-magnetism in the recent standpoint. Z_2 symmetry is taken into account. The bulk geometry is flat and the periodic property is taken into account. After confirming the consistency with the past result, we do new things based on a new regularization. It can be regarded as a string realization of the *sphere lattice* regularization. We do it not in the Kaluza-Klein expanded form but in a *closed* form. The formalism is based on the heat-kernel approach using the *position/momentum propagator*. Interesting relations between the heat-kernels and the P/M propagators are obtained, where we introduce the *generalized* P/M propagators. A useful expression of the Casimir energy, in terms of the P/M propagator, is obtained. In the treatment of the divergences, we introduce IR and UV cut-offs and restrict the (4D momentum, extra coordinate)-integral region, where the *minimal area principle* is exploited. Renormalization flow is realized as the change along the extra-axis. The finite Casimir energy is (numerically) obtained.

Hirotaka Irie (Kyoto university, Department of Physics)
Title: D-branes and Kramers-Wannier duality in non-critical superstring theory
Abstract: In this talk, we study boundary states in non-critical superstring theory, combining the explicit form of matter wave functions. Within the modular bootstrap framework, Cardy states of N=1 superconformal field theory are completely determined in both cases of the different supercharge combinations. Using these boundary states, we determine the explicit form of FZZT-brane boundary states. Annulus mplitudes of FZZT branes are evaluated and principal FZZT branes are identified. In particular, we show that the principal FZZT branes in (p,q) minimal superstring theory do not satisfy Cardy's consistency conditions for each other and play a role of order/disorder parameters of the Kramers-Wannier duality in spacetime of this superstring theory.

Masafumi Ishihara (Department of Physics, Kyushu University)
Title: D3/D7 holographic gauge theory and chemical potential
Abstract: N=2 supersymmetric Yang-Mills theory with flavor hypermultiplets at finite temperature is studied for finite quark number density (n) by a dual supergravity background with nontrivial dilaton and axion. The quark and their number density n are

introduced by embedding a probe D7 brane. We find a critical value of the chemical potential at the limit of n=0, and it coincides with the effective quark mass given in theory for n=0. At this point, a transition of the D7 embedding configuration occurs between their two typical ones. The phase diagrams of this transition are shown in the plane of chemical potential versus temperature. In this phase transition, the order parameter is considered as n.

Hiroshi Isono (Department of Physics, Faculty of Science, The University of Tokyo)
Title: Boundary state of superstring in open string channel
Abstract: We derive boundary state of superstring in the open string channel. It describes the superconformal field theory of open string emission and absorption by D-brane. We define the boundary state by conformal mappings from upper half plane with operators inserted at two points corresponding to the corners of semi-infinite strip. We obtain explicit oscillator forms analytically for the fermion and superconformal ghost sectors.

Etsuko Itou (YITP, Kyoto University)
Title: The BV Master Equation for the Wilson Action in general Yang-Mills Gauge Theory
Abstract: The Wilson effective action for general Yang-Mills gauge theory is shown to satisfy the usual form of Batalin-Vilkovisky (BV) master equation, despite that a momentum cutoff apparently breaks the gauge invariance. In the case of Abelian gauge theory, in particular, it actually deduces the Ward-Takahashi identity for Wilson action recently derived by Sonoda.

Shoichi Kawamoto (Osaka City Univeristy)
Title: Charged boundary states in a Z_3 extended minimal string
Abstract: We study the boundary states of a Z_3 extended minimal model conformal field theory coupled to two dimensional gravity, a Z_3 extended minimal string, which is described by the three-state Potts model coupled to Liouville theory by use of free field realisation. We find that some boundary states that used to be different in Potts model degenerate up to a shift of the boundary cosmological constant and point out that the boundary states are classified with respect to the symmetry of the theory.

Tetsuji Kimura (Yukawa Institute for Theoretical Physics, Kyoto University)
Title: Index theorems on torsional geometries
Abstract: We study various topological invariants on a torsional geometry in the presence of a totally anti-symmetric torsion H under the closed condition dH = 0, which appears in string theory compactification scenarios. By using the identification between

the Clifford algebra on a geometry and the canonical quantization condition of fermion in the quantum mechanics, we construct the N=1 quantum mechanical sigma model in the Hamiltonian formalism and extend this model to N=2 system, equipped with the totally anti-symmetric tensor associated with the torsion on the target space geometry. Next we construct transition elements in the Lagrangian path integral formalism and apply them to the analyses of the Witten indices in supersymmetric systems. We explicitly show the formulation of the Dirac index on the torsional manifold which has already been studied. We also formulate the Euler characteristic and the Hirzebruch signature on the torsional manifold.

Peter Matlock (Department of Electrophysics, National Chiao Tung University, Hsinchu, Taiwan)
Title: Covariant Calculus for Effective String Theories
Abstract: A systematic formalism for the construction of universal actions and the choice of field definition in Polchinski-Strominger Effective String Theories is presented.

Takuya Matsumoto (Nagoya University)
Title: A Secret Symmetry of the AdS/CFT S-matrix
Abstract: AdS/CFT correspondense is very important theme in string theory. We find a new quantum yangian symmetry of AdS/CFT S-matrix which is defined in trems of $su(2|2)$ spin-chain. This symmetry dose not have a Lie algebra analogue.

Toshihiro Matsuo (National Taiwan Normal University)
Title: Hagedorn strings in AdS_3/BTZ
Abstract: We extract Hagedorn behavior of strings in thermal AdS_3 as well as in BTZ black hole obtained through $SL(2,Z)$ transformation and argue thermodynamic properties. In particular we find a tachyonic divergence for a BTZ black hole of string scale. We show the three characteristic temperatures namely, AdS Hagedorn, Hawking-Page and BTZ Hagedorn merge when the AdS radius becomes string scale ($k = 3$) and discuss its implication and some related issues.

Akitsugu Miwa (Institute of Physics, University of Tokyo)
Title: Holography of dual giant Wilson loops with local operator insertions
Abstract: In the AdS/CFT correspondence, it is proposed that the counterpart of a Wilson loop of the k-th symmetric representation is a D3-brane carrying k units of string charge and attached to the AdS boundary. In this talk/poster we consider a D3-brane which is rotating along the S^5 direction. A natural candidate for the counterpart of this D3-brane is a Wilson loop of the k-th symmetric representation with large R-charge local

operator insertions. We investigate this correspondence by using a semi-classical D3-brane solution which propagates along the so-called tunneling null geodesic. We evaluate the classical action of the D3-brane solution and discuss the relation with the expectation value of the Wilson loop.

Takayuki Nagashima (Tokyo Institue of Technology)
Title: Dynamics of Domain Wall Networks
Abstract: Networks or webs of domain walls are admitted in Abelian or non-Abelian gauge theory coupled to fundamental Higgs fields with complex masses. We examine the dynamics of the domain wall loops by using the moduli approximation and find a phase rotation induces a repulsive force which can be understood as a Noether charge of Q-solitons. We conclude that the sizes of all loops tend to grow for a late time in general models with complex Higgs masses, while the sizes are stabilized at some values once triplet masses are introduced for the Higgs fields. We also show that the stationary motion on the moduli space of the domain wall webs represents 1/4 BPS Q-webs of walls.

Tatsuma Nishioka (Kyoto Univ.)
Title: Cascade of Gregory-Laflamme Transitions and U(1) Breakdown in Super Yang-Mills
Abstract: We consider black p-branes on square torus. We find an indication of a cascade of Gregory-Laflamme transitions between black p-brane and (p-1)-brane. Through AdS/CFT correspondence, these transitions are related to the breakdown of the U(1) symmetry in super Yang-Mills on torus. We argue a relationship between the cascade and recent Monte-Carlo data.

Takayoshi Ootsuka (Kinki university)
Title: Colored link representation of quantum entanglement states
Abstract: Consider a spin 1/2 system. We propose to represent the quantum entangled state topologically by using coloured and oriented links. We show that the 2-qubit Bell state could be described by coloured oriented Hopf-links. Further, we try to construct 3-qubit GHZ state and W-state similarly, by coloured and orientable links.

Makoto Sakaguchi (Okayama Institute for Quantum Physics)
Title: Holography of Non-relativistic String on $AdS_5 \times S^5$
Abstract: We discuss a holographic relation between a non-relativistic string on $\mathrm{AdS}_5 \times \mathrm{S}^5$ and a deformed Wilson loop with a source term. The string can be regarded as a semi-classical string around an AdS_2 classical solution corresponding to a straight Wilson line

in the gauge-theory side. The quadratic action with the fluctuations is composed of free massive and massless scalars, and free massive fermions on the AdS_2 world-sheet. In the Euclidean case there exist only non-normalizable solutions. The boundary values of the non-normalizable modes lead to a one-dimensional source term, which gives a deformation of the Wilson line. Then it may be argued from this result that an AdS_2/CFT_1 would be realized as a subsector of AdS_5/CFT_4 . We discuss the Lorentzian case and argue the dual conformal quantum mechanics (CQM). In particular we show the correspondence between normalizable modes on the AdS_2 and wave functions in the CQM.

This talk is based on the collaborations with Kentaroh Yoshida (KITP, UCSB)

Yuya Sasai (Yukawa Institute for Theoretical Physics)
Title: Domain wall solitons and Hopf algebraic translational symmetries in noncommutative field theories
Abstract: We discuss the existence of soliton solutions in Lie-algebraic noncommutative scalar field theory. Since this noncommutative field theory has a nontrivial Hopf algebraic translation symmetry, it is interesting to consider a moduli field around the soliton solution. We construct the domain wall solution of the noncommutative phi4 theory perturbatively and discuss the moduli field around that. We find that the mass of the moduli field is equal to zero as expected from the analysis of usual symmetry.

Matsuo Sato (Kyoto University)
Title: Perturbative Vacua from IIB Matrix Model
Abstract: It has not been clarified whether a matrix model can describe various vacua of string theory. In this talk, we show that the IIB matrix model includes type IIA string theory. In the naive large N limit of the IIB matrix model, configurations consisting of simultaneously diagonalizable matrices form a moduli space, although the unique vacuum would be determined by complicated dynamics. This moduli space should correspond to a part of perturbatively stable vacua of string theory. Actually, one point on the moduli space represents type IIA string theory. Instead of integrating over the moduli space in the path-integral, we can consider each of the simultaneously diagonalizable configurations as a background and set the fluctuations of the diagonal elements to zero. Such procedure is known as quenching in the context of the large N reduced models. By quenching the diagonal elements of the matrices to an appropriate configuration, we show that the quenched IIB matrix model is equivalent to the two-dimensional large N N=8 super Yang-Mills theory on a cylinder. This theory is nothing but matrix string theory and is known to be equivalent to type IIA string theory. As a result, we find the manner to take the large N limit in the IIB matrix model. This talk is based on a collaboration with H. Kawai.

Shunsuke Teraguchi (Nagoya University)
Title: Reformulation of Boundary String Field Theory in terms of Boundary State
Abstract: We reformulate bosonic boundary string field theory in terms of boundary state. In our formulation, we can formally perform the integration of target space equations of motion for arbitrary field configurations without assuming decoupling of matter and ghost. Thus, we obtain the general form of the action of bosonic boundary string field theory. This formulation may help us to understand possible interactions between boundary string field theory and the closed string sector.

Takashi Torii (Osaka Institute of Technology)
Title: Stability of global vertex solution in higher-dimensional spacetime
Abstract: It is well known that higher-dimensional black objects with translational invariance are unstable, which is called Gregory-Laflamme instability. There is a question if this instability is eliminated by adding a scalar hair to the black objects. For the first step, we investigate a regular topological string solution and its stability in the 5-dimensional Einstein-Higgs system. Linear perturbation analysis shows that the string solution is stable for radial mode which is inhomogeneous along the axial direction.

Futoshi Yagi (University of Tokyo)
Title: A-D-E quivers and baryonic operators
Abstract: We study baryonic operators of the gauge theory on multiple D3-branes at the tip of the conifold orbifolded by a discrete subgroup of SU(2). We find that the number and the order of the fixed points of this discrete subgroup acting on S2 are directly reflected in the spectrum of baryonic operators on the corresponding quiver gauge theory.

Masahide Yamaguchi (Department of Physics and Mathematics, Aoyama Gakuin University)
Title: D-term chaotic inflation in supergravity
Abstract: Even though the chaotic inflation is one of the most popular inflation models for its simple dynamics and compelling resolutions to the initial condition problems, its realization in supergravity has been considered as a challenging task. We discuss how the chaotic inflation dominated by the D-term can be induced in supergravity, which would give a new perspective on the inflation model building in supergravity.